The Afghanistan Engineering Support Program assembled this deliverable. It is an approved, official USAID document. Budget information contained herein is for illustrative purposes. All policy, personal, financial, and procurement sensitive information has been removed. Additional information on the report can be obtained from Firouz Rooyani, Tetra Tech Sr. VP International Operations, (703) 387-2151.

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ENGINEERING SUPPORT PROGRAM

WO-LT-0042 AMD3
Afghan Women Internship Program
2014 Academic Year Final Report

February 11, 2015

This publication was produced for review by the United States Agency for International Development (USAID). It was prepared by Tetra Tech, Inc.

This report was prepared for the United States Agency for International Development, Contract No. EDH-I-00-08-00027-00, Task Order 01, Afghanistan Engineering Support Program.

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February 11, 2015

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Re: Contract No. EDH-I-00-08-00027-00/ Task Order No. 1
Afghanistan Engineering Support Program (AESP)

Final Report FY2014

Dear [redacted],

Tetra Tech is pleased to provide the Final Report for Academic Year 2014 of the Afghan Women Internship Program. The enclosed report summarizes the program activities from January 12, 2014 through January 15, 2015. Included are summaries of the training provided, final reports from the interns themselves, and the internship curriculum.

Tetra Tech is proud of the impact this program has on the lives of our interns, and the program exemplifies USAID OEGI and Tetra Tech's commitment to capacity building and gender equality in the engineering community.

Please contact me at your convenience should you have any questions or comments regarding this report.

Respectfully,
Tetra Tech, Inc.

[redacted], PE
Acting Chief of Party (AESP)

For

[redacted]i, PE, BCEE
Chief of Party (AESP)

AFGHANISTAN ENGINEERING SUPPORT PROGRAM

Contract No. EDH-I-00-08-00027-00
Task Order No. 1
WO-LT-0042
Afghan Women Internship Program
2014 Academic Year Final Report

February 11, 2015

EXECUTIVE SUMMARY

Tetra Tech's (Tt) Afghanistan Engineering Support Program (AESP) provides training opportunities for female students enrolled in engineering, architecture, and related programs. The program was started in 2011, making 2014 the third full year of this program. The program is coordinated with the leadership of the universities in Kabul, although it has no affiliation with the universities.

Engineering, long considered a field unsuitable for women in Afghanistan, offers limited opportunities for recently graduated female engineers. Women are often discouraged to pursue the career path or are unaware that positions are available for women. Tt's internship program provides professional training and practical training while promoting gender equality and women's empowerment.

The internship program provides opportunities to apply skills and concepts learned through coursework to "real world" situations. It is intended to provide exposure to design and collaborative processes, site visits, design software, program management, research, project implementation, and other topics in the fields of Civil, Mechanical, Architectural, Structural, Transportation, Electrical, and Environmental Engineering.

The internship program is designed to deliver a wide variety of job training throughout the year. The interns spent approximately 1250 hours developing career skills at Tt AESP's office. Through this process, the interns learn valuable lessons and gain real life experiences to better equip them to be competitive candidates in the field of engineering.

The primary focus of the program is to: fill the gaps in their theoretical education, provide professional experiences to students, and to promote critical thinking skills. However, a secondary yet equally important purpose is to promote gender equality in Afghanistan. Women gain confidence and are given experiences that have not been previously offered to women. The program is carving a place for women in Afghanistan Engineering.

This program has continued to evolve over time. Each year, AESP analyzes the past program and makes improvements for the upcoming year. This allows AESP to provide a more comprehensive program catered to the intern hired. This dedication to providing a supplementary education to meet international standards allows the majority of internship graduates to pursue successful careers in engineering.

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1.0 INTRODUCTION

The mission of the Afghan Women Internship Program is to design and implement an internship program for female students studying architecture, engineering, and other related fields. The interns are in their last academic year at universities in the Kabul area. The program will provide opportunities to apply skills and concepts learned through coursework to "real world" situations. While the program is centered on workplace interaction and training to expand the interns' capabilities, a secondary focus is to promote gender equality and women's empowerment. The Tt AESP provides the interns with the tools to not just succeed, but to thrive in a male-dominated field and culture.

During the month of January 2014, 12 female engineering students from Kabul University and Kabul Polytechnic University were interviewed. Four were selected to participate in Tt AESP's Afghan Women Internship Program. Three were from Kabul University, and one was from Kabul Polytechnic University. Two were studying civil engineering and two electrical engineering. On average, the interns spent three days a week interning from January 12, 2014 through January 15, 2015. They trained with a variety of engineers in diverse applied engineering areas. The details of the interns' training and work experience are described in the sections below.

2.0 INTERNSHIP PROGRAM

Tetra Tech (Tt) strives to provide an effective internship opportunity for local national female engineering and architectural students under the Tetra Tech Afghanistan Engineering Support Program(AESP). In close cooperation with expatriate engineers and local national professionals this program provides the interns opportunities to apply skills and concepts learned through university coursework in a professional engineering environment.

Tt AESP's 2014 Afghan Women Internship Program covered three areas.

- The first and main focus of the program was to integrate concepts students learned in diverse engineering programs with practical experience. This was accomplished by providing engineering training programs and discussions to supplement and expand upon concepts learned in the classroom.
- The second area encompassed professional development training including communication and workplace etiquette.
- The third area aimed to promote gender equality and encourage participation of female students in math and science based professions.

The main objectives for the interns included:

- Solving realistic engineering planning and design problems
- Becoming familiar with current codes, standards, and specifications
- Developing skills for interacting with practicing professionals
- Developing skills for interacting with individuals outside of the engineering profession
- Empowering women studying Engineering

As part of the internship requirements, all four interns were asked to write a final summary and evaluation of their experiences in the program. These documents can be found in Appendix A.

2.1 ENGINEERING TRAINING

The female engineering interns in the Tt AESP internship program learned engineering skills and professionalism by receiving on-the-job training and performing assignments to build capacity, not to support Tt work order workload, attending theoretical and practical training sessions, and by shadowing expats and local staff of Tt AESP and USAID engineers.

All four interns' education was based around either civil or electrical engineering. Therefore, program topics centered on these engineering disciplines.

Engineering topics included:

- Structural Engineering
- Site Monitoring
- Quality Control and Quality Assurance
- Transportation Engineering
- Safety in Engineering
- General Civil Engineering
- General Electrical Engineering

In addition to the above topics, other training included supplemental workshops, shadowing events with professional engineers, site visits, and software training.

2.2 ENGINEERING DOCUMENTS

A major part of engineering design is the development of engineering documents. Therefore, this was a focus for the interns throughout their internship period.

All interns participated in cost estimation and bill of quantity development training. This included training and discussions with Tt AESP engineers as well as attending training sessions with USAID engineer, [redacted].

All interns were expected to improve their technical writing skills. In particular, they participated in the development of general reports for all work orders (WOs) and technical writing training. In addition, the interns were expected to report on their internship experience in the form of memos and reports. After they developed each document, they were given feedback on report organization and technical writing. Some of these documents can be found in the Appendices.

2.3 PRACTICAL ENGINEERING

The interns worked directly with lead expat engineers and local national engineering professionals in a team environment to: learn work processes, gain experience in teamwork, ask pertinent questions, and learn from the engineers' experience. The interns performed a variety of routine engineering assignments as training exercises under supervision. The interns performed basic engineering tasks such as the review of simple plans and computing basic engineering calculations under supervision of their trainers.

2.4 TRAINING AND WORKSHOPS

Workshops served as a major training component aimed at supplementing the interns' formal education and giving them practical experience. Some workshops or training were required for all interns, however others were tailored to the interns' personal interests. The workshops varied from in-depth and hands-on workshops to detailed discussions with various engineers on specific topics.

2.4.1 Construction Material Training

2.4.1.1 Concrete

The content of this training covered lectures on mix design which included a concrete mixing activity. The mixing activity included calculation of cement, aggregate, sand, and water amounts for different types of concrete. Hands-on concrete testing in the lab (i.e. concrete strength, slump test, etc.).

In May, a concrete workshop was given in three parts: lecture, mixing, and lab testing. A Tt AESP local national engineer and an expatriate senior engineer with experience in concrete led all three workshops. The lecture consisted of concrete mix designs, testing standards, and an assignment. Upon completing the assignment, the interns were asked to create a mix design and perform slump testing during the mix production. Concrete samples were collected from the respective mix designs. The samples cylinders were cured for a few days, after which they were taken to a lab for testing of compressive strength. See Appendix B for the interns' memorandums on the concrete workshop.

2.4.1.2 Soils

The soils program training included lectures on Soil Mechanics theory and hands on soil testing in the lab which included sessions in: the California Bearing Ratio (CBR) test, moisture content, Atterberg limits, proctor tests, soil classification, and coaching.

In June, a soils workshop was given in two parts: lecture and lab testing. In both parts, a Tt AESP local national engineer and an expatriate senior engineer with experience in soil mechanics instructed the course. The interns' learned about five different soil tests and their application. In the lab, they witnessed the tests being performed by the lab technicians. See Appendix C for the interns' memorandums on the soils workshop.

2.4.1.3 Asphalt

The interns received lectures on: asphalt in theory and hands on asphalt testing in the lab. Also included are coaching sessions and site visits to ongoing road projects when available

In July, a Tt AESP transportation engineer held an asphalt workshop in two parts consisting of a lecture on asphalt composition and creation, with applications to road construction and tests to use while building roads. During the lab portion of this workshop the interns witnessed the tests being performed by lab technicians. There were no site visit opportunities to ongoing road projects due to safety and security issues. See Appendix D for the interns' memorandums on the asphalt workshop.

2.4.2 Project Estimation

The content of the project estimation training covered: project cost management, construction material estimates (quantity take-off), and operation and maintenance cost estimates (short and long term O&M budget estimates).

In July, [redacted] an USAID Engineer, held a project estimation workshop at the AESP compound for the interns. The total duration of this training was two months. In this workshop he covered: project estimation, project cost and material estimation, project construction work process scheduling, and some general information in engineering. Interns worked on both drawings and calculations for an assignment. See Appendix E for the interns' memorandums on the Project Estimation workshop

2.4.3 Project Management Workshop

This workshop covered a basic overview of project management, scheduling, and work load balancing. This year the training occurred at USAID. Engineer [redacted] trained and was shadowed by the interns. Topics included project management, scheduling, performing assignments, and general discussions.

2.4.4 Electrical Training

This training was held for the Electrical engineering interns in the electrical department of AESP. The interns received updated information about their field. The engineers kept them busy with sample problems and assignments.

This training covered industrial heat tracing, lighting, photovoltaic system sizing, renewable energy and the environment, specification and drawings for 24.9/14.4 kV line construction, grounding systems, electrical load estimation, lightning effects, transmission lines, transformers, medium voltage line, substations, basic design, wiring, general grid theory, and electrical load estimating.

See Appendix F for the interns' memorandums on the electrical training.

2.4.5 Shadowing

Through the job shadowing program, the interns were able to have discussions with Professional Engineers (PE) at USAID about real world engineering issues, current engineering projects, and challenges faced.

All four interns visited USAID to shadow engineers and learned about current USAID projects, plans, and staffing. They met with several engineers (Table 1) and held discussions about ongoing USAID projects. They also attended meetings to improve their communication skills by interacting with other professional engineers from USAID and associated organizations. Interns participated in Kajaki Dam Unit #2 Installation Coordination meetings at IRD – EQUALS on three occasions. During these meetings and shadowing events the interns asked questions and gained knowledge about holding meetings.

See Appendix G for the interns' memorandums on the Shadowing events and Appendix L for the interns' memorandums on the Kajaki Unit #2 Coordination meeting.

Table 1. USAID Shadowing Details

Dates Visited	USAID Shadowed Engineers
February 13, 2014	[redacted]
March 16, 2014	
September 18, 2014	
December 12, 2014	
January 5, 6, 8, 2014	

2.4.6 Site Visits

Two types of site visits took place during the internship period. One type focused on buildings under construction and the second type was for electrical substations. The most important site

visit took place at the U. S. Embassy construction sites for the new Embassy housing and offices. This was led by USAID and Embassy construction engineers. The interns saw the construction site and were able to ask questions directly to the project manager.

The second site that was visited was to the Tarakhil Power Plant. The interns accompanied both local national and expatriate engineers to the site to collect data for the Tarakhil Power Plant Water Piping System replacement design and pressure test.

The third site visit was Kabul North Substation. The interns accompanied local national engineers and surveyors to the site to collect data. Interns received information about surveying and the use of the Total Station system. The interns performed practical exercises on site using the Total Station. See Appendix H for the interns' memorandums on the site visit workshop.

Table 2 summarizes the site visits offered to the interns during the year.

Table 2. Site Visit Details

Sites	Applicable Engineering Disciplines	Dates
Tarakhil Power Plant	Civil, Electrical Engineering	February 25, 2014
Kabul North Substation	Civil, Electrical Engineering	June 03, 2014
USAID/US Embassy Construction Sites	Structural, Civil, Architectural and Electrical Engineering	October 15, 2014

2.4.7 Engineering Software Training:

Software training was provided to the interns during the program and including the following:

2.4.7.1 Auto CAD

Basic and advanced tutorials for AutoCAD 2014 were provided. Advanced work was provided for those interns interested in a more comprehensive knowledge of the CAD system. The interns learned both Tt AESP and USAID AutoCAD standards.
The content of the training included:

- An introduction to Auto CAD
- Setting up a template
- Exposure to the AutoCAD workspace and layout
- Menus and short cuts
- Use of basic drawing, editing, and viewing tools
- Organizing drawing objects on layers
- Inserting reusable symbols (blocks)
- Adding text, hatching, and dimensions
- Use of scales
- Preparing a layout to be plotted
- Plotting a drawing
- A practical Auto CAD project.

The training duration was for more than one month. See Appendix I for the interns' memorandums on the Auto CAD Training.

2.4.7.2 Auto CAD Civil 3D

Basic and advanced tutorials for AutoCAD Civil 3D 2014 were provided. The content of the training included:

- Introduction to Auto CAD Civil 3D
- Preparing a topographical plan
- Creating points, surface, alignment, profiles, corridors, and sections
- Geometric design of road
- Practical sample project.

The duration of this training was for more than one month that included a road design example in the Civil 3D. See Appendix J for the interns' memorandums on the Auto CAD Civil 3D Training.

2.4.7.3 GIS (Geographical Information System)

ArcGIS training was provided to all interns for two to three hours a week over a month. The training included a basic introduction to GIS applications and assignments to practice those applications.

The content of the training provided an introduction to GIS. This included: Arc Map interface and tools, data view,layout view, layers, data frames, map elements, layer properties for symbols and labels, tools for examining your data, working with the selection tools, metadata, geographic data review, linking features and attributes, data formats, working with Arc catalog, editing spatial data, editing attribute data, Geo referencing, coordinate systems, datum, projections and distortion, projecting data, table structure, data types, table manipulation, connecting tables, working with graphs and reports, basic cartographic concepts, creating maps in Arc Map, and printing and plotting maps. After completing this training interns led a workshop on GIS for fellow students at Kabul University. See Appendix K for the interns' memorandums on the GIS Training.

2.4.7.4 STAAD Pro

Other software training included STAAD Pro, a common structural engineering design software used in Afghanistan.

The training covered introduction to STAAD-Pro V8 and how to utilize the space, menus (File, Edit, View, Tools, Geometry, Select, Commands, Analyze, Mode, and Window).
The training included a practical example to design a reinforced concrete structure of a two-story building.

2.4.7.5 MS Project

This training covered introduction and overview, activity breakdown, sequence activities, assign resources, assignment durations, developing and controlling the schedule and automatically leveling and viewing resources.

All common Microsoft Office programs such as Excel, Word, PowerPoint were used throughout the internship period, with special emphasis on Excel as a tool for structural design.

Table 3, below summarizes the Software training offered to the interns during the year.

Table 3. Software Training Details

Software	Applicable Engineering Disciplines	Training Level
AutoCAD	Transportation, Architectural, Civil, and Electrical	Intermediate to Advanced

AutoCAD Civil 3D	Transportation, Architectural and Civil	Beginner to Intermediate
STAAD Pro	Structural	Beginner
MS Project	Transportation, Architectural, Civil, and Electrical	Beginner
ArcGIS	Urban Planning/Mapping	Beginner
Microsoft Excel	All fields	Beginner to Intermediate

2.4.8 Professional training

Throughout the internship period, the interns were continually exposed to common workplace etiquette beyond typical engineering tasks. This training included topics in communication and professional development.

2.4.9 Communication

Communication is an important aspect in all business settings and is often not emphasized in science related fields. It is however important to include as part of any workplace learning experience. Tasks covered under communication included:

- Document control, including filing procedures, and structures
- Technical writing (memos, reports, emails)
- Meetings; including etiquette, preparation, and minutes
- Presentations, public speaking, and Microsoft PowerPoint design
- Preparation of periodic reports such as daily or quarterly reporting

Other forms of communication were also developed, such as technical writing. This training included writing in general, rules of writing, writing memos, quarterly reports, and final reports. Other assignments for writing such as presentations on engineering or their experiences in the intern program were also given. AESP 2014 interns also prepared presentations for various local educational institutions (Sardar Kabuli Girls High School, Kabul University, etc.).

The first presentation was given to the students of Sardar Kabuli Girls High School, where the interns provided information about: the Engineering field as it relates to women, the role of the English language for their future goals and career, how to use the internet to research scholarship opportunities, and how to prepare for the Kankor exam for acceptance into Afghanistan Universities.

The second presentation was given to students at the engineering faculty of Kabul University. This knowledge transfer focused on the topic of GIS (Geographic Information System).

Additionally, [redacted] (POC for the Internship Program) prepared a presentation to OEGI staff about the internship program on the curriculum and the benefits of this program for female students. During this presentation, the interns and the DCOP of AESP [redacted] accompan[redacted]

See Appendix M for the interns' memorandum on the Sardar Kabuli Girls High School Presentation.

2.4.10 Professional Development

When nearing the end of the internship period emphasis was placed on skills useful for post internship and graduation employment. These workshops covered :

- Resume preparation
- Cover letter preparation
- Interview Skills

The resume workshop included a presentation on resume structure, the difference between a CV and resume, examples, and discussions on how to tailor the CV to different jobs. Each intern had a chance to discuss their personal resumes for improvement and present revisions for professional review. Following this, professional interview training was conducted. This included mock interviews with individual feedback from the interviewers. The job-search training was given by expatriate and local staff.

2.4.11 Internship Program Curriculum Development

Each year the POC of this program updates and develops the internship program curriculum; deciding which training and workshops are most suitable for the year. The POC evaluates the outcome and effectiveness of the previous year's training when creating the curriculum. The curriculum is based on the interns' field of study. It is designed to include subjects that are necessary for a career in Engineering, but lacking in the interns' formal university training.

See Appendix N for the 2014 internship program curriculum.

3.0 SUMMARY AND ANALYSIS

Tt AESP's 2014 Afghan Women Internship Program covered many engineering workplace topics crucial to the development of the young female engineers' careers. Topics included basic workplace tasks such as: technical writing, engineering design, document control, engineering calculations, and training in common engineering software. Experience provided by the program also included lessons in more specific engineering topics: transportation engineering, and construction site visits. These lessons are coupled with shadowing experienced engineers from a variety of backgrounds.

The program structure serves as basis to build upon and improve on for future years of the engineering internship program. Every year the curriculum is catered to the engineering field of the interns hired. However analyzing 2014 there would be certain improvements that Tt will put in place for 2015. Firstly, to provide more opportunities for site visits. Also, the program intends to include material testing; to have the interns not only observe but to participate in material testing. The upcoming year will introduce new subjects of Quality Assurance, Quality Control, and Safety following the shift in AESP work orders. Finally, Tt would like to provide more opportunities for giving presentations, not only to improve the interns' skills but to increase awareness of opportunities for women in the young girls of Kabul

The training curriculum supports the learning objectives of the Afghan Women Internship Program through practical education, workshops, hands-on training of various engineering techniques, and lessons in engineering software. The curriculum mirrors the skills that the interns will need for their future careers in Engineering. Each year, enhancements help the internship program to grow into an even greater resource to advance the education and careers of young women in Afghanistan.

APPENDICES

APPENDIX A
INTERN 2014 FINAL REPORT

USAID | AFGHANISTAN
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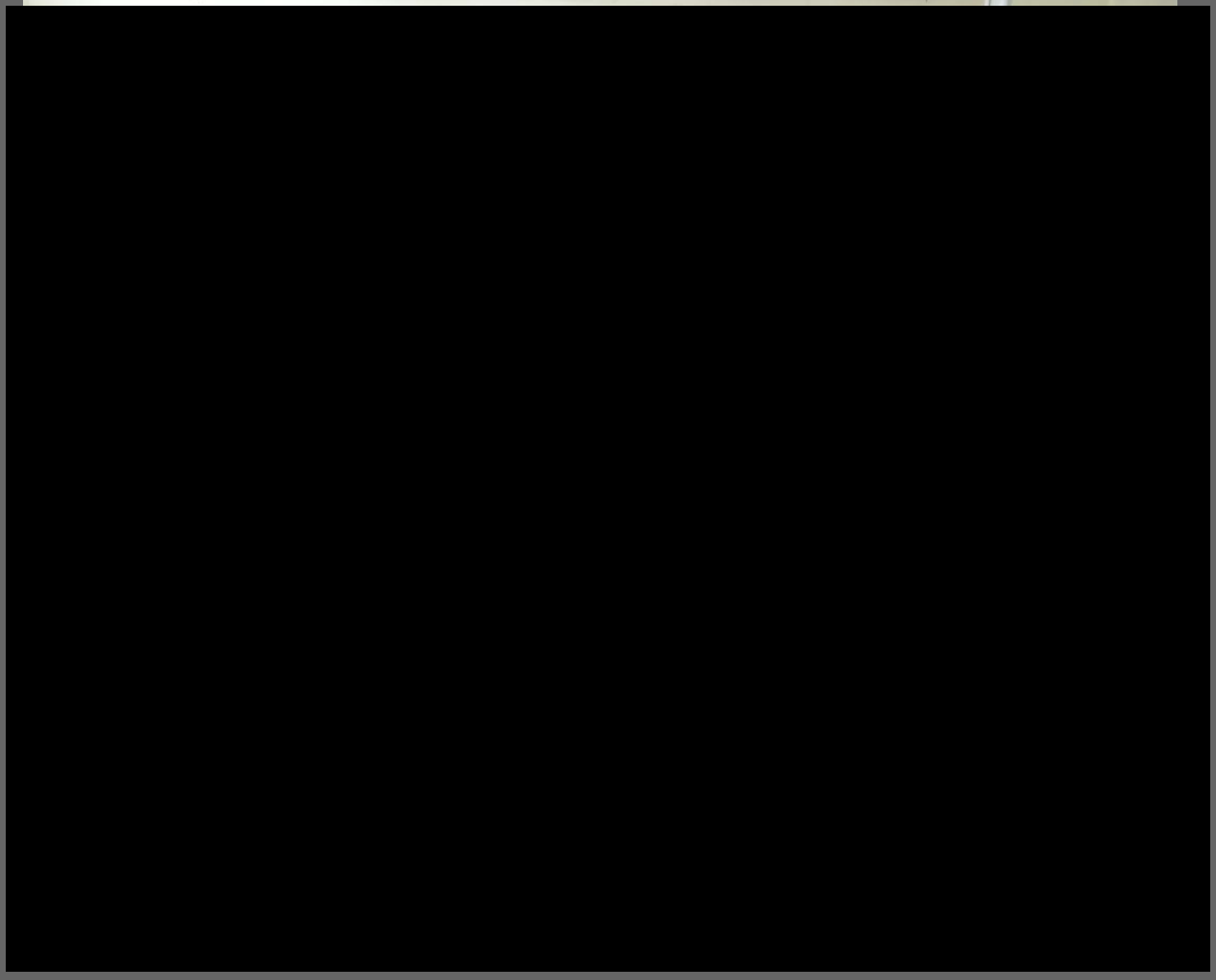
ENGINEERING SUPPORT PROGRAM

WOLT0042

Afghan Women Internship Program

Falaknaaz Danishyar – 2014 Final Report



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AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WO-LT-0042

AFGHAN WOMEN INTERNSHIP PROGRAM

2014 FINAL REPORT

[redacted]

JANUARY 12, 2014 – JANUARY 15, 2015

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1.0 INTRODUCTION

The Afghan Women Internship Program is funded by USAID and implemented by Tetra Tech-AESP for Afghan female engineering students entering their 4th Class in the university.

This program provided a lot of opportunities for interns that are not available from the universities.

I was one of the lucky students that joined this program by Tetra Tech (Tt). I spent one year with Tt and it was the most helpful year of my education. I was able to learn my lessons in a practical way, assisted by Tetra tech expat and local engineers, and I gained a lot of practical knowledge about electrical engineering.

During this period I become familiar with Tetra Tech and USAID engineers. I also became familiar with different work environments and office work.

It wasn't only an opportunity, Tt was a place where my qualifications could make a difference, and I received the experience that will enable me to work well after graduation.

2.0 ACTIVITIES

Internship is a great opportunity for final year engineering students. In this program we received all what was necessary to know about management work, standards, and CAD, and received enough work experience to allow us to able to work after graduation from the university. We had individual and team work activities. I attended some software and electrical training sessions, construction materials workshops, CAD seminars, site visits, and USAID shadowing exercises.
The training I was involved in is listed below:

- Tarakhil Power Plant site visit
- Kajaki Dam Weekly Meetings
- Job shadowing at USAID
- Software training (Auto CAD)
- Training on Electrical subjects
- Online training (Access 2010, MS. Project)
- Communication Skills

3.0 ASSIGNMENTS

3.1 SARDAR KABULI GIRLS HIGH SCHOOL PRESENTATION:

Presentations are one of the most important keys for increasing self-confidence and transferring knowledge and information to others.
During the internship program we had an assignment to perform a presentation for Sardar Kabuli Girls' High School students.

This presentation covered the topics about the engineering field and how women can work in this field, what are the benefits of internet researches for some class assignment and the role of English Language on their future career.
The presentation goal was to encourage the female students in their last year of study in the school to consider the engineering field, learn the English language and provide guidelines on proper internet use. It was one of the best experiences of my life that I felt self-confidence during presentation and felt I successfully presented and performed this assignment.

Figure 1: Interns presenting to the students of SKGH.

3.2 TARAKHIL POWER PLANT ASSIGNMENT:

I was assigned to enter data into the inventory lists that belonged to the Tarakhil Power plant. In this data entry I learned many electrical expressions. It was helpful for me and I am happy that I was directly involved in this project.

3.3 GIS PRESENTATION ASSIGNMENT:

After taking GIS (Geographical Information System) software training, the next step was to prepare a presentation about Google Earth as part of a GIS Knowledge Transfer for the students at Kabul University. I prepared a draft presentation about Google Earth and presented it to the Tt management team. After incorporating their comments I successfully presented it to the students.

Figure 2: [redacted] presenting to the students of Engineering Faculty at Kabul University

4.0 TRAINING

This training involved knowledge transfer between different people to receive information and skills about a general issues related to their fields.

In the one year of our internship, I learned useful topics with the assistance of Tetra Tech's electrical engineers. The topics are listed below:

- Medium voltage systems
- Street lighting
- Transmission lines
- Basic design (wiring)
- Design of lightning protection
- Voltage drop+ SC calculations
- Medium Voltage System Equipment
- Photo-voltaic (PV) introduction
- Transmission line Equipment
- Equipment's of Lightening protection
- Introduction to Substations
- Heat trace cable sizing
- Power Generation
- Electrical Load Estimation
- Wiring Interior Distribution Systems
- Short Circuit Calculation

SOFTWARE TRAINING: In this program we also had software training and courses which included; AutoCAD, Access, MS Project, and GIS software.

EFFECTIVE WRITING TRAINING: We had an effective writing training which was very useful for me. I had not been exposed to the process of effective writing before. But after the course, I could write my quarterly reports and memos by using of what I had learned from effective writing training.

TOTAL STATION TRAINING: For learning and practicing the use of the Total Station surveying system, we went to the Kabul North Substation. While there we received general information about Surveying and the Total Station system. Each intern had the opportunity to practice with the Total Station.

A Total Station has the following capabilities:

- Angle measurement
- Distance measurement
- Coordinate measurement
- Data processing

Figure 3: Interns setting up Total Station at Kabul North Substation site.

CONCRETE TRAINING: This training included a lecture about concrete, a concrete mix design practical lab held at the Tetra Tech villa, and subsequent testing of the concrete in a commercial lab. Each intern prepared their own mix design which we tested in the lab. We learned that a concrete mix is designed by using cement, coarse and fine aggregates, water, and chemical admixtures.

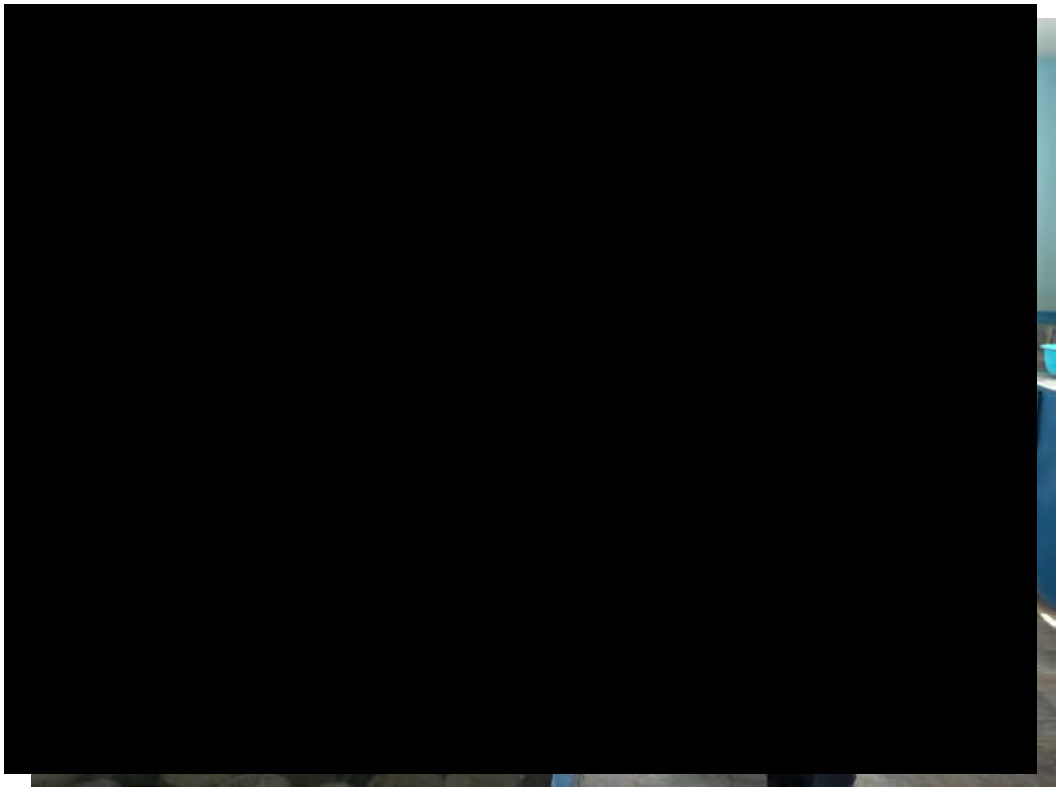

Figure 4: Interns during concrete testing in the Shawal laboratory.

SOIL TRAINING: soil training was consist of two parts (lecture and lab). It helped us learn much more about soil mechanics such as its strength and classification

Figure 5: Interns and Engineer [redacted] Soil lab.

COST ESTIMATION:

We studied cost estimation with engineer [redacted] (USAID civil engineer), three days a week for two months. In this training we started estimation of a simple house which consisted of one room, corridor, toilet, and a kitchen. We received important information about estimation and were given assignments and homework during the course.

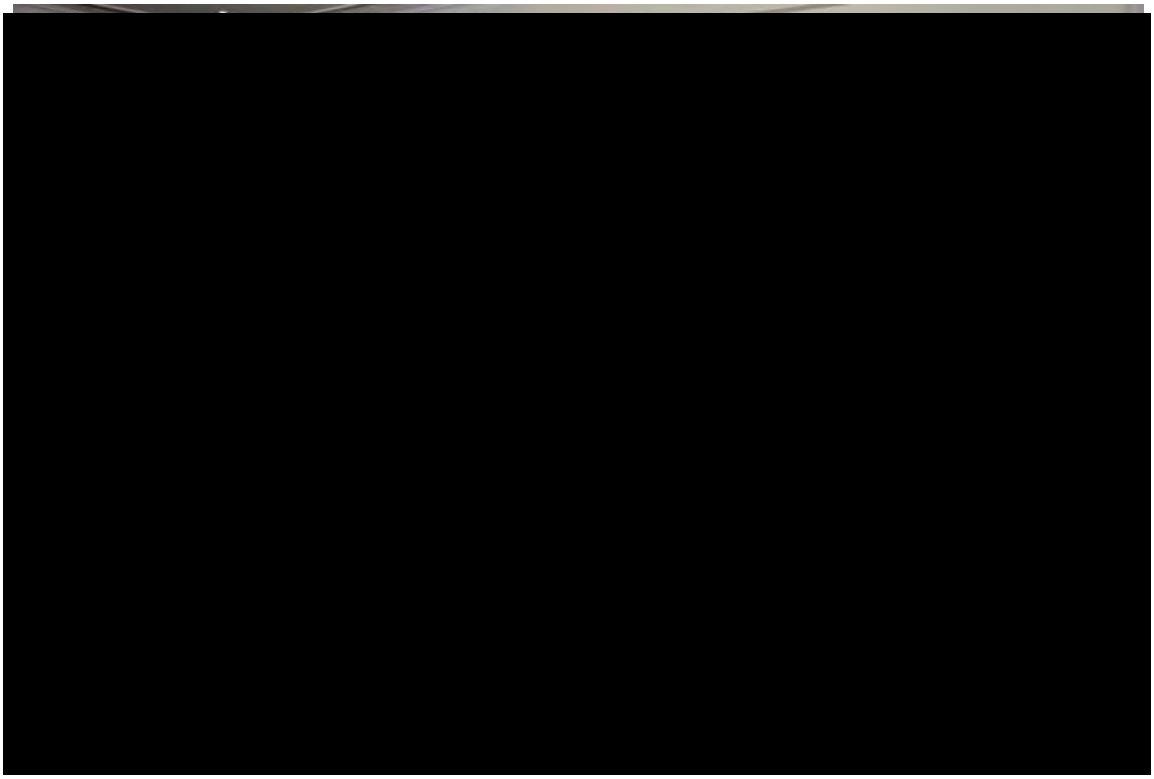

Figure 6: Interns and [redacted] in cost estimation training in Tt conference room.

GIS: We studied GIS with [redacted] (Tetra Tech GIS expert), where we covered the following subjects:

- Introduction of GIS
- Usage
- Interface
- Creating shape a file
- Geo referencing

ASPHALT: asphalt training consisted of two parts. The first involved lectures and the second focused on the procedures used in the asphalt lab.

Engineer [redacted] taught both the asphalt lecture and lab. We learned about asphalt, bituminous mix, paving, and compaction.

When we were in the laboratory, we performed the following tasks:

We heated up bitumen to 110^0C, then the hot bitumen was air-cooled until it was room temperature. Then we determined the grade of bitumen. After that, we performed Marshal testing on the bitumen. We specify gravity specifications, and then combine the asphalt and bitumen. We heated the mix to a specified temperature, and we performed testing to determine should find the VFA, MFA, air wide, stability, wearing course, binding course.

Figure 7: Interns and Engineer [redacted] in Asphalt Laboratory

PROJECT MANAGEMENT TRAINING: The project training management sessions were taught by engineer [redacted] from USAID. This training is a very important topic for everyone that works in management position. He kindly introduced and described the project management main points.

He helped to define the following concepts:

- WBS (work breakdown structure)
- EV (Earn Value)
- AC (Actual Cost)
- PV (Planed Value)
- SV (Schedule Value)
- SPI (Schedule Performance Index)
- CPI (Cost Performance Index)
- BAC (Budget at Complete)
- EAC (Estimate at Complete)
- ETC (Estimate to Complete)
- CV (Cost Variance).

This course lasted three days, and every day we had assignments related to the topic.
It was a very helpful topic for me, I received new and updated information about project management techniques that I didn't know before.

5.0 SITE VISITS AND SHADOWING:

5.1 SHADOWING;

Shadowing was one of the most effective elements of the intern program. During shadowing, engineers hold group discussions and share ideas and new information with each other.

Shadowing was a completely new experience for me. We had four shadowing sessions at USAID. The purpose of this shadowing was to get introduced to the USAID engineers and get exposed to future activities. Shadowing with USAID engineers was really informative because in every minute I learned and experienced something new and interesting.

5.2 SITE VISIT:

During our internship program at Tt, we made several site visits to buildings and substations under construction.

TARAKHIL POWER PLANT SITE VISIT: We went to the Tarakhil Power Plant for one of our site visits. The purpose of this site visit was to observe the fire system pressure testing.

This site visit was a great opportunity for me because I visited pump houses, fuel tanks, power blocks, and the substation generator floor. While there we saw pumps, generators, transformers, radiators, cooling units, control rooms, switch gear, voltage transformers, current transformers, and in general got to know the various power plant parts.
I received important information about the substation equipment.

NORTH SUBSTATION: We made a site visit to the North Substation, where we continued to learn about power plants as well as Total Station surveying techniques. Kabul North Substation is a Substation located on 5th street of Taimani in Kabul. It has two input and two output transmission lines, and has a 160 Mega Watt capacity with 4 transformers. This Substation feeds the east of Kabul.
The North substation equipment we saw included: Transformers, a control room, circuit breakers, disconnectors, relays, voltage transformers, current transformers, and fire alarms.

U.S. EMBASSY SITE VISIT: We made a site visit to the U.S. Embassy, where we visited the new U.S. Embassy building which was under construction. We toured all indoor and outdoor areas of the new US Embassy buildings. I received information about it and in my point of view, it is a very unique construction technique not typically used in Afghanistan that I had not seen before.

6.0 RECOMMENDATIONS

I am grateful for all of the kind engineers that trained us and answered all of our questions very patiently and honestly. It was a very complete program for us.
I really want to thank Engineer [redacted], my supervisor, for providing great and useful programs for us.
I also have some recommendations;

- I suggest more electrical labs for electrical interns
- I suggest more site visits
- I suggest more electrical software training for electrical interns.

7.0 ACKNOWLEDGMENT

As an intern I want to thank the USAID and Tetra Tech organizations that held this effective internship program for female engineer students, and our kind supervisor Zurwa Farhad who always tried to schedule the training to best fit with our schedule.

Thanks to the USAID engineers for the valuable shadowing and site visit programs and their patience for sharing their information and answering our questions.

Thanks to Engineers [redacted] the Tt electrical department, and all the staff that answered our engineering questions. I feel myself very fortunate that before graduating from school, I was exposed to an engineering environment which it is very useful and advantageous for me. Thanks again from all those that made these opportunities available to us.

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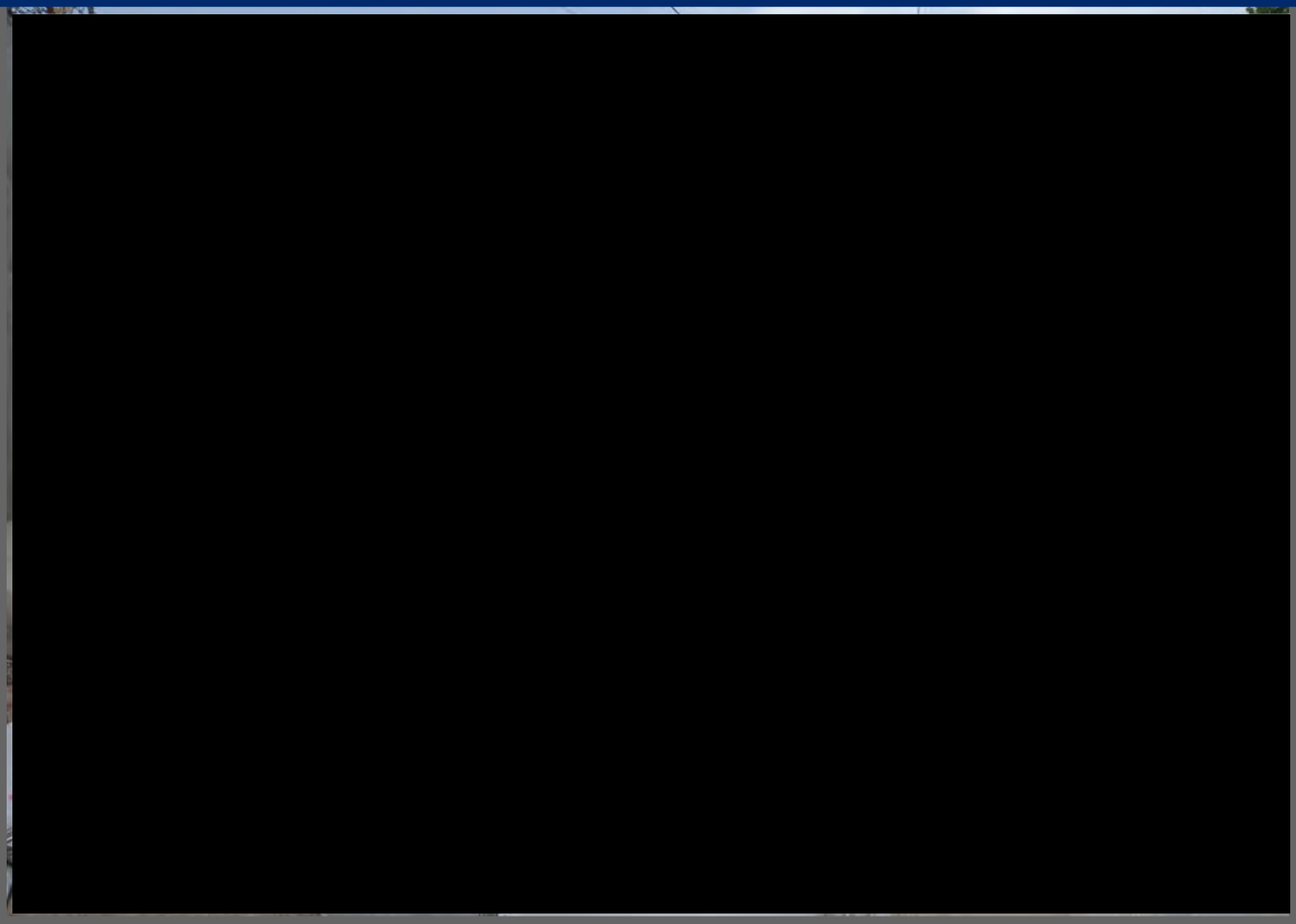
ENGINEERING SUPPORT PROGRAM

WO-LT-0042

Afghan Women Internship Program

[redacted] – 2014 Final Report



January 15, 2015

This publication was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech, Inc.

AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WO-LT-0042

AFGHAN WOMEN INTERNSHIP PROGRAM

2014 FINAL REPORT

[redacted]

JANUARY 15, 2015

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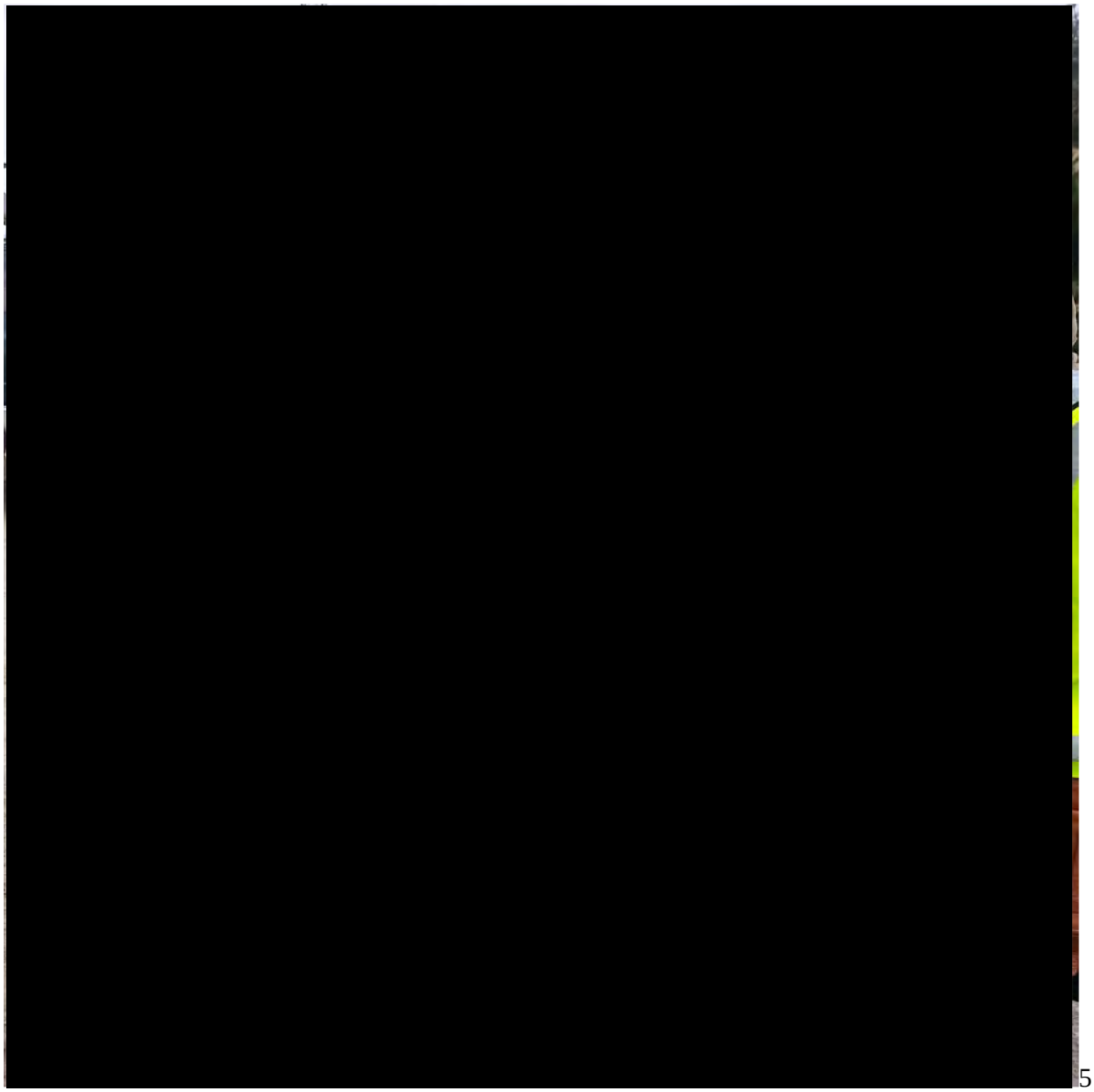

5

Figure 2: Using equipment during a Site visit at Kabul North Substation working with Total Station.. 5

1.0 INTRODUCTION

The internship program for Afghan female engineering students which is being funded by USAID and created by Tetra Tech (Tt), has been very effective and had a great influence on its participant's careers. This program provides practical training experiences under supervision of professional experts, allowing the students to improve their skills, letting them gain experience, and applying all these achievements in their working career as well as in their educational period of life. The most beneficial engineering issues such as team work, office communication skills, working in a practical engineering environment, and most importantly strength and self-confidence which are the real and greatest achievements in a student's life. This program was really effective especially in software training, site visits, shadowing at USAID, and visiting soil laboratories. Briefly, all the practical training helped us to learn practical management. Interns are provided computers, outlook email address, and mentorship from expert engineers, educational books and resources. Through this process and interaction, the interns learned several valuable lessons and gained real life experiences better equipping them for the future workforce.

2.0 ACTIVITIES

The activities we were mostly involved with were all the ones that sometimes I worked individually and as a team member for my own capacity building and achieving work experience. I participated in several projects, work on CAD drawings, providing reports, and bill of quantity, estimation of the project, review of maps, and as built drawings.

I had some software and construction materials training, standard CAD working, site visits, and USAID shadowing.

Activities I participated in and shadowed are listed below:

- Tarakhil Power Plant (CAD working and CAD Standards checking)
- Learning and practicing how to review submittals and shop drawing of GK road Phase# 4 Project
- Review of the Bridge# 9 and Bridge# 10 design, specifications, drawing and calculation on the GK Road Phase# 4 Project
- Shadowing submittal tracking on Tracking Sheets for GK Road Phase# 4 Project
- Presentations for Kabul University Students and Sardar Kabuli Girls High School
- Overview of Tarakhil Power Plant inventory data entry processing
- Attended USAID meetings on GK Road Phase# 4 Project

3.0 TRAINING

The following are the main trainings that I have participated during one year of my internship program in Tetra Tech:

- **Software Training:** Engineering software as well as the MS Office package online training that was provided to us by Tetra Tech and the relevant websites helped us a lot to work with standards. It even helped us do our school projects as we learned to work within standard levels. The software we were exposed to include: Auto CAD, Civil 3D, GIS, STAAD Pro., Red Vector Technical and Management online Training, And MS Project. I was familiar with Auto CAD program before, but I learned new techniques, how to work drawings according to standards, and standard printing. Also we had a GIS workshop with [redacted] which gave us practical skills.
- **Concrete Training**: This training was organized in three parts (lecture, Concrete mix design calculation, and concrete lab) this training was very helpful because aside from the theoretical lessons, we become involved in the practical process of providing a concrete mix designs and testing them in the Lab.
- **Cost Estimation Training:** This training was one of my most favorite trainings that I had during the one year of my internship, because the topics that were covered in this training were really important and interesting to me.
- **Asphalt training:** was one of the most effective and useful training sections during my internship, because I could actually see the mixing process of asphalt. This training was held in two stages; first we get a lecture about asphalt, and second we went to a laboratory to witness the mixing process.
- **Soil Training**: Soil training consisted of two parts (Soil lecture and Soil lab) we performed five different soil tests in the lab that included:
    - CBR (California bearing ratio) Test
    - Proctor Test
    - Sieve analysis
    - Atterburg limits
    - Sand Cone Density method

It was a very important training for me because I had never seen soil tests in the lab before.

4.0 SITE VISITS AND SHADOWING:

USAID shadowing is one of the greatest and most effective parts of our internship program. USAID engineers provide group discussions and share their ideas, experience, and new information with us. We had been invited by USAID for many shadowing opportunities regarding water issues in Afghanistan such as providing power via dams (Kajaki Dam) and also distribution of power in Helmand as well as Kandahar. Shadowing was one of the most interesting and exiting parts of our internship for me because each time there was something new to learn and a new expert engineer to interact and learn from.

Shadowing was really useful and informative for me because in a short period of time we received lots of up-to-date information from experienced engineers.

Besides shadowing, site visits were also really important opportunities and a beneficial part of the program for us. Although more site visits would have been even better, it was still very interesting. This part of an internship is one of the most effective parts because it helps the interns get practical knowledge which will not be forgotten easily. This gives the interns a

good chance to ask and solve their questions because there are many experts and engineers available to learn from.

We had three site visits during our internship; one to Tarakhil Power Plant, a second trip to the U.S. Embassy buildings under construction where we saw the construction work progress, and a third trip to the Kabul North Substation, where we learned about surveying and the use of the Total Station survey instrument. All of these site visits were very interesting and helped us a lot to know more about site.

5.0 RECOMMENDATION:

The internship program of year 2014 was an extremely valuable and handy program. Though we are really satisfied with the all of the opportunities provided, I offer the following recommendations to improve the program and make it more effective.

- Increase the number of site visit opportunities
- Provide more shadowing opportunities beyond USAID, such as the various Ministries
- Increase USAID shadowing opportunities
- Provide more technical writing training
- Increase site visits from under construction buildings
- Project management, QA, and QC Training
- Offer scholarships.
- Encourage interns to explore other internships
- Provide interns the opportunity to get introduced to more ideas in the engineering field

6.0 ACKNOWLEDGMENT

As an intern I would like to express my deepest appreciation to all those who provided me the opportunity to complete this internship. And special thanks I give to the Tetra Tech technical staff, especially my supervisor Engineer [redacted]. Her contribution in stimulating suggestions and encouragement, helped me a lot to successfully run my internship as well as write all my reports. I want to thank USAID for funding such an effective internship program for female engineering students. Many thanks to USAID engineers for giving us their precious time and allowing the opportunity to shadow their work activities, sharing their experiences, information and answers to our questions.

I feel very fortunate and blessed that before my graduation I got the chance to be a part of such an acknowledged engineering team that helped me to learn and gain more experience to improve myself in my career. Thanks again to all those who played an effective and supportive role to make this program run more successfully.

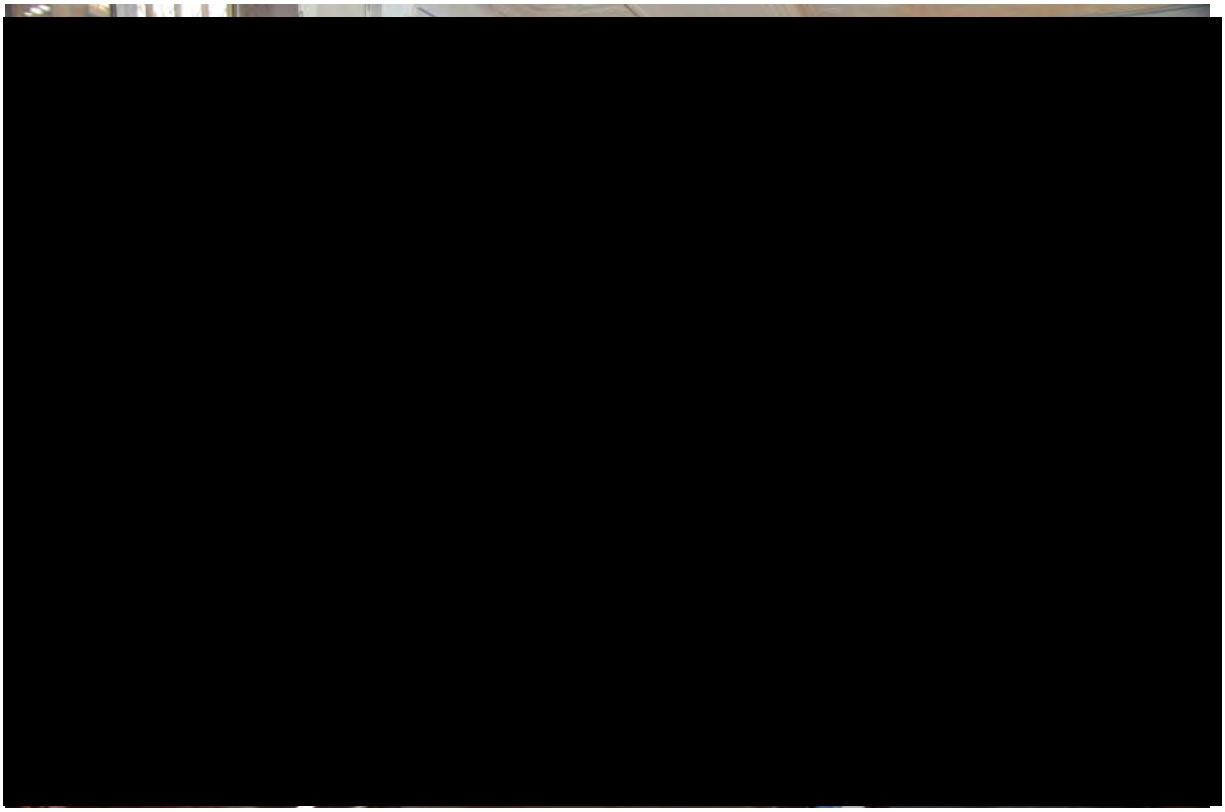

Figure 1: The other interns and me during Cost Estimation Training in Tt conference room.

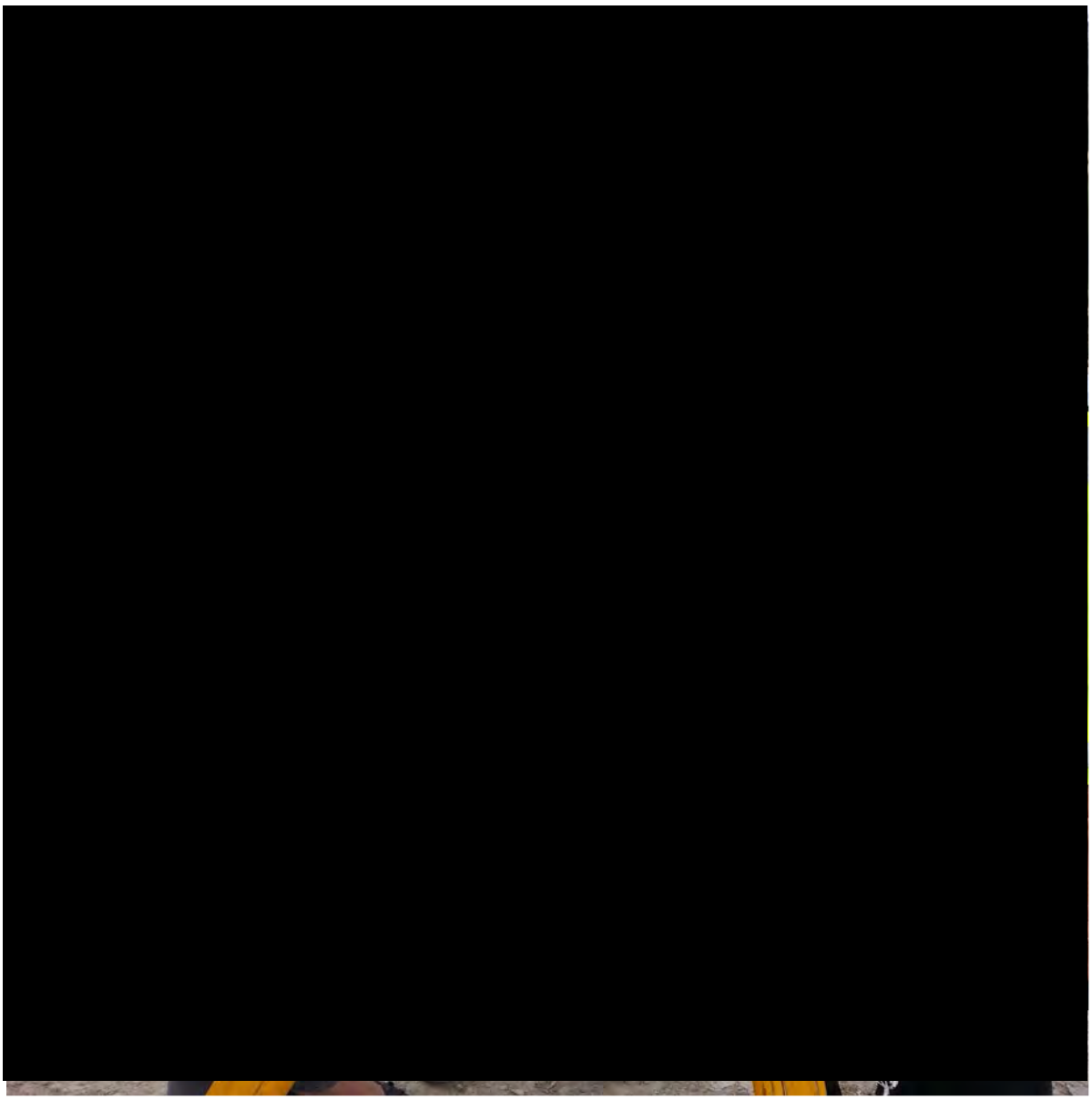

Figure 2: Using equipment during a Site visit at Kabul North Substation working with Total Station.

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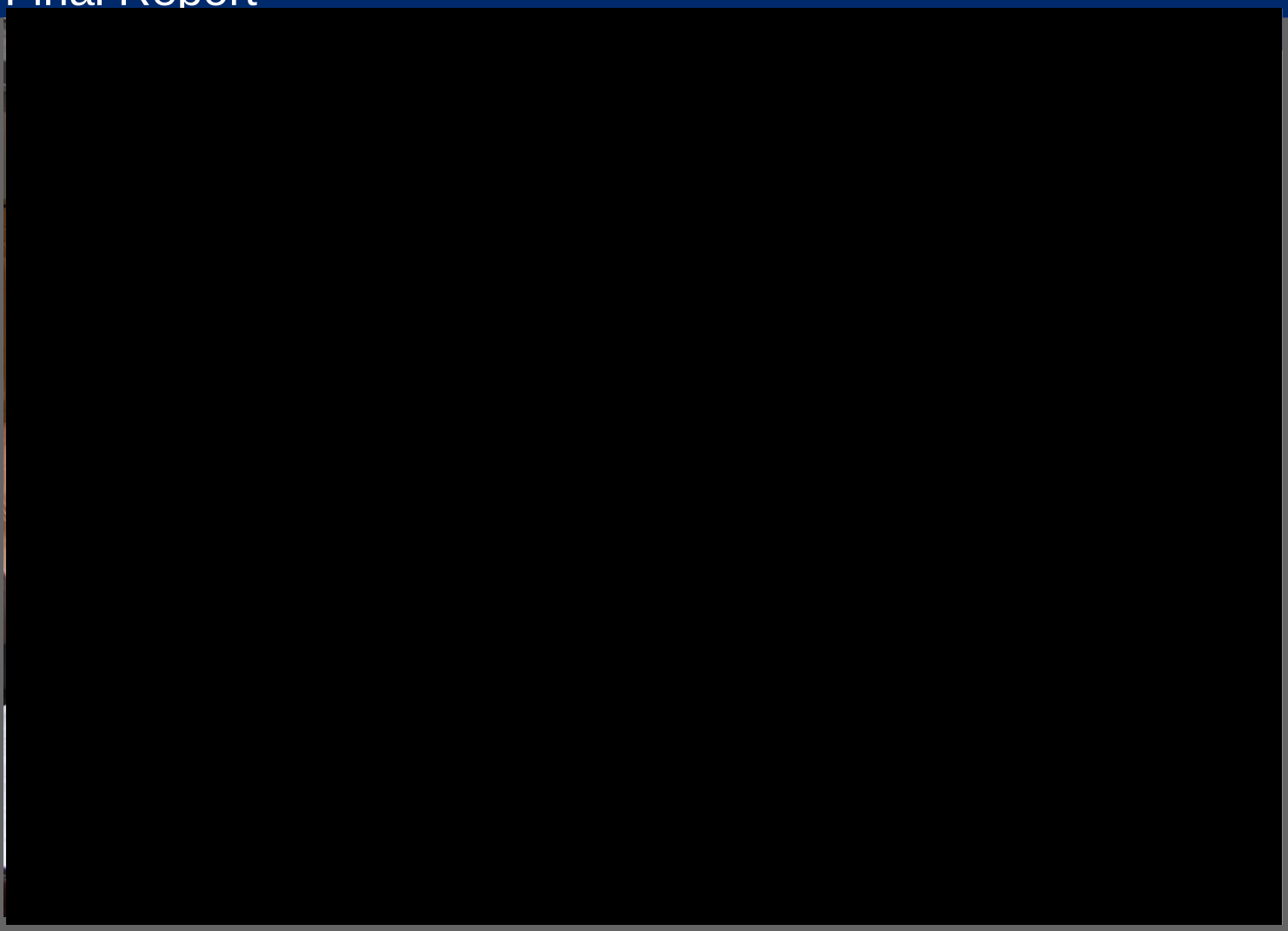
ENGINEERING SUPPORT PROGRAM

Contract No. EDH-I-00-08-00027-00
Task Order No. 1
WO-LT-0042 AMD3
Final Report



January 15, 2015

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AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WO-LT-0042

AFGHAN WOMEN INTERNSHIP PROGRAM
2014 FINAL REPORT
[redacted]

JANUARY 12, 2014 - JANUARY 15, 2015

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1.0 INTRODUCTION

The Afghan women internship program funded by USAID and conducted by Tetra Tech is one of the golden opportunities for Afghan female engineers to enhance their technical knowledge and skills. In my point of view, the main purpose of the Internship Program is to facilitate student learning opportunities outside the classroom in a real engineering environment. These experiences provide the ability to apply classroom theory to "real world" situations thus enhancing the students' academic and career goals.

Internship provide students the opportunity to develop attitudes conducive to effective interpersonal relationships and increase a student's sense of responsibility.

This program provides directed, practical learning experience, outside of the normal classroom setting, in which interns sharpen their skills, gain experience through work on advanced productions, and learn firsthand how professional companies or organizations operate. The program also provides practical training for improving the technical and professional skills of interns in engineering field and other general fields.

This program has provided the interns more facilities for improving their engineering knowledge, communication skills, technical and professional skills (i.e. computers, outlook email address) and mentorship from expert and local engineers, and educational books and resources.

2.0 ACTIVITY

The internship program provides both didactic and practical activities that follow a developmental sequence. This program also provides the necessary structure, guidance, and support to facilitate the development of each intern. She then moves toward greater autonomy and gains the skills, knowledge, and confidence to master increasingly complex tasks and decisions during the course of the training year. I am very lucky that I joined this beneficial program. When I completed the Tetra Tech internship interview process, I succeed and joined with Tetra Tech and I hope that one day I could join Tt as an Electrical Engineer.

The activities that I had in one year are listed below:

- **ON THE JOB TRAINING:** This training was one of the most powerful tools during this internship program. I participated in a series of small projects, several training, construction site visits, women educational encouragement, meetings, etc. One of the most interesting activities which I did was data entry, where I filled and entered Tarakhail Power Plant data into an Excel spreadsheets. This activity taught me very important electrical and other general expressions, also the manner in which data is entered. In addition I also worked on some CAD drawings which were interesting and useful for me. I was involved in a number of projects during (July, August, September) months in 2014 for capacity building.

- **SHADOWING:** Shadowing is a popular on the job learning, career development, and leadership development technique. Essentially, shadowing involves working with another employee who might have a different job and might have something to teach, or can help the person shadowing him or her to learn new aspects related to the job, organization, certain behaviors or competencies.
  Fortunately we had very useful shadowing sessions in USAID, and we got more experience, knowledge from other engineers and shared our ideas with each other. We had five shadowing experiences during this internship program. The issues which we discussed included Kajaki dam unit two installation, construction contract development, and other interesting topics.
  Mr. [redacted] was one of the professional engineers who discussed these issues in a very practical session. Eng. [redacted] discussed project scheduling and project management in a very effective session. In addition to the technical and professional skills we gained during the shadowing process, we also became familiar with staff of USAID and US Embassy, each person shared their experience with us. That was one of the most useful methods which I faced during these shadowing.

- **COMMUNICATION:** Effective communication was one of the most powerful tools I was exposed to during this internship. Everything was new for me in an office environment. But day by day I became more familiar with each specialist in each field. By sharing ideas, and the experiences of each person, I became better at providing effective communication between myself and the specialists in each field. The main communication tool I used was the MS Outlook program. Using this program, I was able to ask questions from every person in Tt, especially electrical and civil engineers. I enjoyed spending my time with Tt staff.

- **INTERN PRESENTATIONS:** Another interesting activity in this internship program was the fantastic presentation for Sardar Kabuli high school. The aim of this presentation was to encourage female students about their lessons in school and give them information about the engineering field, the English language and its benefit, and the importance of internet in their professional life. Another informative presentation was created for the Kabul University Engineering faculty students. This presentation focused on the use of GIS in the engineering (and other) fields. This presentation was scheduled to take three days, lasting three hours per day. Each intern provided a presentation about topics related to GIS software. After each presentation, Mr. [redacted] gave a practical example of GIS in the engineering field.

3.0 TRAINING

The main purpose of the internship program is to provide additional training for engineering students to supplement their studies at the university, and fortunately I had useful training during this one year which are describe below:

SOFTWARE TRAINING: Software is one of the most important tools for engineers, so we received very comprehensive software training during this term which included:

- Online training: Word 2013, Excel 2010, Windows 8, Access 2010, MS project 2010.
- Office training: AutoCAD 2010, MS Project 2010, GIS (Geographic Information System).

ASPHALT TRAINING: This training section was very effective and useful during my internship, because I saw the mixing process of asphalt. This training was held in two stages, first we received a lecture about asphalt, and secondly we went to a laboratory to observe the practical side of asphalt production. Eng. [redacted] was our trainer for this section. He kindly and tirelessly described all topics. I thank him for his efforts during this training. Below are the activities we observed in the asphalt laboratory:

- Bitumen which was brought for testing was heated up to 110^0C, then the heated material was placed outdoors to cool.
- The grade of the bitumen was determined.
- Marshal testing was performed to determine characteristics of the material, including asphalt content, stability, flow, and density.

ELECTRICAL TRAINING: During the first three months of the year (January, February and March) I received training to build capacity, and lessons with Tt electrical engineers. The topics they covered are listed below:

- Medium voltage system
- Street lighting
- Transmission line
- Basic design (wiring)
- Design of lightening protection
- Voltage drop
- Medium voltage System Equipment
- Photo-Voltaic (PV) System introduction
- Transmission line Equipment

- Lightning protection
- Basic Design (wiring)
- Introduction to Substations
- Heat trace cable sizing
- Power Generation
- Electrical Load Estimation
- Short Circuit Calculation
- Wiring Interior Distribution System

- **COST ESTIMATION:** One of the most important issues for all engineers is to know, calculate, and estimate a project in terms of cost, quantity, and time. Fortunately, we gained the opportunity to learn cost estimation which was covered by Eng. [redacted] one of the experienced and professional engineers at USAID. We started this course in June. We had three lectures each week and the total duration of this training lasted two months.
  [redacted] described how to calculate material volumes of material, planning, initiation, execution, and closure of a project. This training was an opportunity to gain self-confidence to estimate other projects by ourselves, so it was a very helpful phase of training during the internship program.

- **PROJECT MANAGEMENT:** This phase of training focused on the set of skills, tools and management processes required to undertake a project successfully. Fortunately, I had the opportunity to learn this important topic from Eng [redacted], a very gifted project manager in USAID.
  He kindly described scheduling, cost scheduling, WBS (work breakdown structure) and other important topics related to projects like EV (Earn Value), AC (Actual Cost), PV (Planned Value), SV (Schedule Value), SPI (Schedule Performance Index), CPI (Cost Performance Index), BAC (Budget at Completion), EAC (Estimate at Completion), ETC (Estimate to Complete) and CV (Cost Variance). This course lasted three days and every day we had assignments related to the topics.

Figure 1: Me Introducing Engineering at Sardar Girls High School.

Figure 2: Eng. [redacted], Describing Concrete in Tt Conference Room.

Figure 3: [redacted], describing the Asphalt mixing process at the laboratory.

Figure 4: Interns with [redacted], discussing project estimation in the Tt Conference Room.

4.0 RECOMMENDATIONS

I really appreciated this program because in this one year it provided very informative and effective topics, not only in electrical engineering, but also the fields of civil, architectural, structural and other fields like communication between staff in an office and other things.

So I kindly recommend that if it's possible to extend the duration of this program to get more training and experience. I have recommendations below for more improvement of this program:

- Technical Writing Training
- Useful Codes Training (NEC, IEEE…)
- More emphasize on Cost Estimate of the projects
- Increase USAID and other Ministries Shadowing
- Increase site visits from under construction buildings
- QA and QC Training
- Safety Training
- Material Testing in the LAB individually

5.0 ACKNOWLEDGEMENT

As an intern, I want to thank the USAID and Tetra Tech organizations that created and funded this effective internship program for female engineer students. I would also like to thank our kind supervisor Zurwa Farhad who always tried to customize the schedules and program according to our suggestions.

Thanks also to USAID engineers for allowing beneficial shadowing and site visits programs and their patience for sharing their information and answering our questions.

Thanks to [redacted] and all the staff that always answered our engineering questions very kindly. I feel myself very fortune that before graduating

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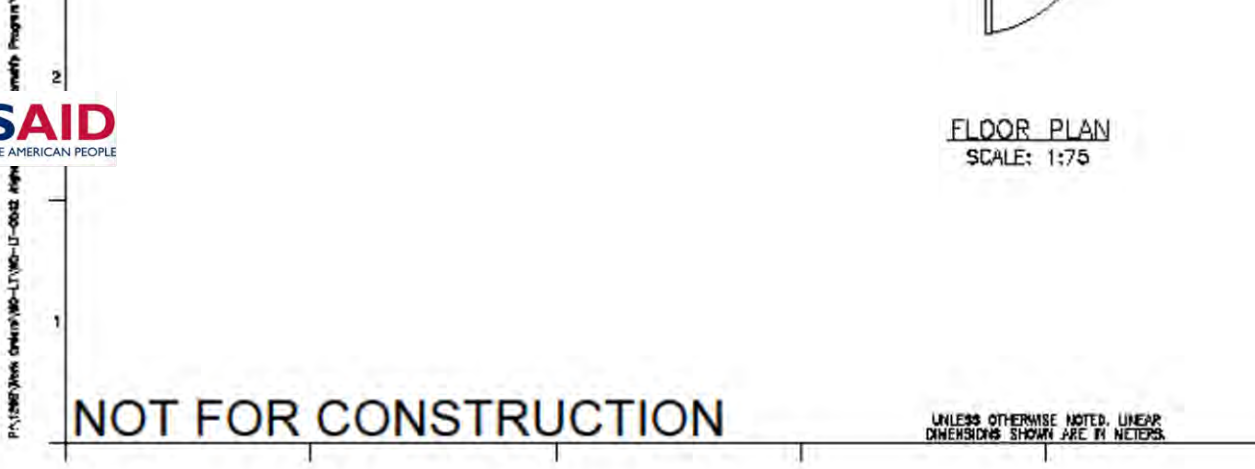

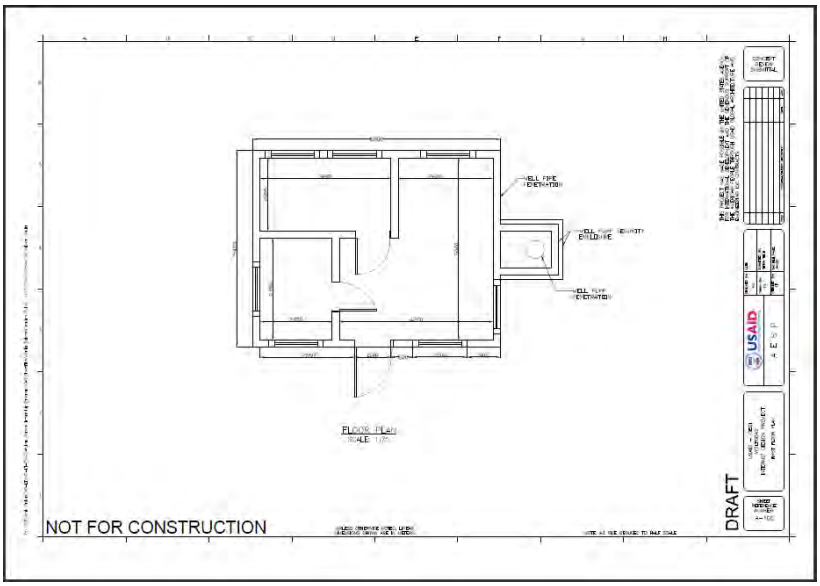

- Electrical Heat Tracing Cable Sizing: is a system used to maintain or raise the temperature of pipes and vessels. Trace heating takes the form of an electrical heating element run in physical contact along the length of a pipe. The pipe must then be covered with thermal insulation to retain heat losses from the pipe. Heat generated by the element then maintains the temperature of the pipe. Fortunately I had this training with En[redacted]one of the professional electrical engineer in Tt, the duration of this training was three days, and after the completion of the lecture I design by my own this cable which is inserted below:

– Heat tracing Cable Sizing –

I. We start Our Sizing by below Guidlines:

1- Maintain temprature : +6°C = 42.8°F
2- Minimum ambinet temprature : −15°C = 5°F
3- Pipe Diameter and Material : 8inch , Steel
4- Pipe insulation type , thickness : Calcuim Sillicate , 3inch

II. Differential temprature:
(2)
$\Delta T = T_M - T_A$
$\Delta T = 6°C - (-15°C) = 21°C$
ΔT in Farenhiet is → $f = 9/5\,C + 32 = \frac{9}{5}(21) + 32 = 69.8°F = 70°F$

III. Pipe heat loss : To Find the Pipe heat loss We Refer to table.
(3) To use table we need insulation thickness , ΔT , and Pipe diameter.
To use table we need value For 70°F So we Use in table we don't have any Value For 70°F So we Use Linear Interpolision to Find :

ΔT	Heat loss
100°F	7.9 → 7.9 − 3.8 = 4.1
70°F	d ← d − 3.8
50°F	3.8

100 − 50 = 50
70 − 50 = 20

$\frac{50}{20} = \frac{4.1}{d-3.8} \Rightarrow 2.5 = \frac{4.1}{d-3.8} \Rightarrow 2.5d - 9.5 = 4.1 \Rightarrow 2.5d = 4.1 + 9.5 = 13.6$
$\Rightarrow d = \frac{13.6}{2.5} = 5.44$

So The pipe heat loss For a pipe which has 3inch insulation thickness, 8inch diameter and differential temprature 70°F is 5.44 W/Ft.

Next We Calculate the total heat loss in Pipe.
Total heat loss = Pipe heat loss × insulation Compensation Factor
Total heat loss = 5.44 × 1.50 = 8.16 W/ft

IV. Now We Want to Select heating Cable family :
(4) For this Purpose We Refer to table.
According to table it is Neccessary to Know Pipe Moterial and Maintain temprature.

1

The maintain tempreture is 42.8°F and Pipe Matrial is Steel (Metal)
So we choose QTVR Family type. Because this Family type has
Maximum maintain tempreture of 150°F (63°C)

V (5) Service Voltage : The Service Voltage is 120V.

VI (6) Heating Cable Power Output Rating :- For this purpose we need to know heating Cable Family and Service Voltage.
So For Service Voltage of 120V and QTVR family type the Power Out Put rating is 11 W/ft.

VII (7) Select the Jacket type : The Perfect jacket type Use in QTVR family is CT(Fluoropolymer)

At the End We Can Write Our Consirent Cable type in Standard Form
→ 11- QTVR - 1- CT

VIII (8) How is the term to Calculate the heating Cable lenght. So We should Observe these Points:

- pipe Lenght and diameter : 200Ft, 8 inch diameter
- TYPE and number of Values : Five, 6 inch Gate Values.
- Type and number of Pipe Supports: Support shoes, 12 each 2.ft lenght.
- Number of Circuits and Tees in the Piping : Power Connection 1, End Seals 3, Pipe Tees 2.

* Calculate heating Cable For lenght of pipe :
200Ft Pipe needs to 200Ft Cable For Single tracing.
* Calculate heating Cable For the Valves :
According to the table For 8 inch diameter we have:
Each values Requires. 5Ft
Cable Needed For Five Values : 5 × 5 Ft
Total Cable lenght needed For Values . 25 Ft
* Calculate the total lenght of heating Cable For pipe Supports :
* 12.2Ft lenght Welded Steel Shoe Support.
* Heat loss For One support : $Q_{sup} = 0.76 \times (T_M - T_A) \cdot L$ → Support lenght(Ft)

$Q_{sup} = 0.7 \times 2 (42.8 - 5) = 52.92 W$

2

* Heat loss For all Supports : $12 \times 52.92W = 635.04W$
* Add Safety Factor . $635.04 + 10\% = 698.544W$
  10 % of 635.04 is Equal to 63.504 .
* Heating Cable Required = $\frac{\text{total Support heat loss}}{\text{Heating cable Power output}} = \frac{698.544W}{11 W/Ft} = 63.5 Ft$
* Calculate additional heating Cable For Connection kit insulation :
  Estimate the number of Power Connection, tees, and Splices For System . Allow additional 3Ft For each kit Connection .
  Power Connection 1, End Seals 3, Pipe tees 2,
  Total number of Connection kits : 6
  Cable Needed For 6 Connection kits : $6 \times 3 Ft = 18 Ft$.
* Total heating Cable For Whole Pipe :
  Cable For piping : 200 Ft , Cable For Values : 25 Ft
  Cable For Support : 63.5 Ft , Cable For Connection kits : 18 Ft
  Total Lenght of heating Cable = $200 + 25 + 63.5 + 18 = 306.5 \approx 307 Ft$
* Now is the term to determine the Circuit Breaker type .
  According to table We don't have any CB For 11QTVR . and 307 Ft lenght .
  So We choose the 15QTVR heating Cable , 40 A CB .
* At the End We Select Connection kits , Tee, and Splice
  Connection From Ketlock of these Equipment .

3

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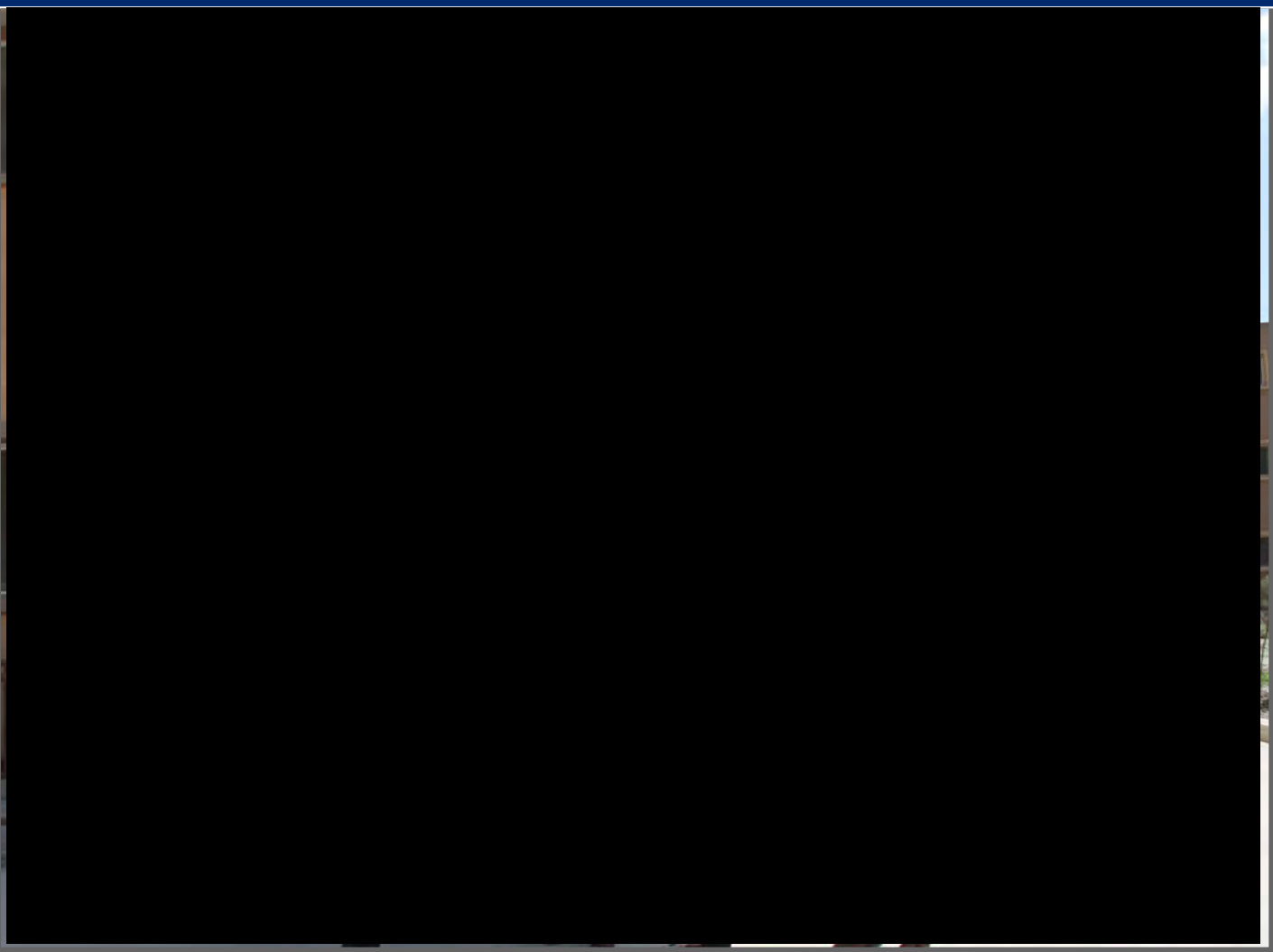
FROM THE AMERICAN PEOPLE

ENGINEERING SUPPORT PROGRAM

WOLT0042

Afghan Women Internship Program

[redacted] – 2014 Final Report



January 15, 2015

This publication was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech, Inc.

TETRA TECH

TETRA TECH

AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WOLT-0042

AFGHAN WOMEN INTERNSHIP PROGRAM

2014 FINAL REPORT

[redacted]

JANUARY 12, 2014 – JANUARY 15, 2015

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1.0 INTRODUCTION

An Internship program that has been funded by USAID and conducted by Tetra Tech-AESP this year that has helped female engineering students to develop in their respective fields. Because engineering is mostly a male dominated field, this is an opportunity for female students to learn and practice engineering.

During the one year internship program, students worked on their existing skills and learned new skills like writing reports, memos, assisting in different engineering projects, engineering site visits, and attending engineering training workshops.

Interns were provided computers, an Outlook email address, and mentorship from expert engineers, educational books and other resources.

2.0 ACTIVITY

The internship program is a project created to advance engineering knowledge and supplement the intern's university education with the help of some of the brightest engineering minds.

The program consists of useful tasks that promote capacity building and skill improvement of the interns, which is useful for receiving fair job offers. When I successfully completed the Tetra Tech internship interview process, I joined Tetra Tech. and I wish that I become an Employee in future for Tt. I feel fortunate to be part of this team.

The activities that I participated in during my year-long internship are listed below:

ON THE JOB TRAINING: I received instruction from mentors in some of the project activities during my time at Tt. One exercise included data entry, in which I entered data from the Tarakhil power plant on Excel spreadsheets. I learned some important facts about electrical and other general expressions, also the standards used to enter data. In addition I also worked on CAD drawings on transformers drawings and also worked on residential house drawings, worked on soil reports, some of concrete companies' proposals, retaining wall drafts and many diverse project activities during year 2014 for my own capacity building.

SHADOWING: is a popular on-the-job learning, career development, and leadership development tool for female engineering interns. USAID shadowing involved working with other engineering experts who were working and had different engineering projects in hand. These engineers had important engineering facts to teach, and helped the interns to learn new aspects related to the engineering projects.

Fortunately, I learned a lot about engineering issues during my shadowing at USAID. Projects we shadowed during our internship included the Kajaki dam unit two installation, construction contract development, the PROMOTE program, U.S. Embassy construction, and Water Research at USAID. Shadowing has always been one of my favorite parts of the internship program because during the shadowing process, I could meet professionals and learn interesting engineering topics and interact with new people, such as [redacted]

LEADERSHIP: The Tt internship program consists of three primary components – personal development through team leadership immersion, applied leadership and mentoring. Through the tasks that were given to us, we could evolve from thinkers to doers. I personally experienced personal development in my communication skills, and giving presentations to different audience categories like Sardari Kabuli Girls High School where we inspired them to become female engineers in the future.

Tt also held a GIS knowledge transfer workshop for the Kabul University civil department. Through these tasks I was challenged to boost my self-esteem and self-confidence as a female engineer and understand teamwork and leadership in practice. One of the most important facts about the intern program was that they always treated us well in a manner that we felt our presence was important. Tt staff were so encouraging and believing in us that we couldn't help but gain confidence and trust ourselves to do the challenges to our best abilities.

We received interview experience through mock interviews. It was a great experience to prepare us for the future. We understood the important points about an interview and as usual everyone was extremely encouraging.

3.0 TRAININGS

Under the mentorship of our supervisors we gained experience with the latest engineering software through classroom training. We also learned about various areas of engineering, such as described below:

3.1 SOFTWARE:

- Online training: MS Project 2010.
- Office training: AutoCAD 2010, GIS (geographical information system), Civil 3D, Staadpro V8i.

- **ASPHALT TRAINING:** during the training I observed the process of asphalt mixing, this training was divided into two phases:

  1- We attended lectures about the use of asphalt on road projects.
  2- We travelled to a laboratory to observe the mixing process for asphalt.

  Eng. [redacted] was our mentor during this training. He explained all important points about asphalt and told us about his experiences in the asphalt area. I appreciated his efforts and thank him for giving his valuable time to us.

  During our visit to the asphalt laboratory, we observed the following: Bitumen brought for testing was heated up to 110^0C, then the heated bitumen was placed in the free air to cool. The grade of bitumen was then determined. We then performed a PG (penetration grade) test in order to determine the remaining characteristics of the bitumen. After the grade of bitumen was determined, Marshal testing was performed. Marshal testing is used to determine the percentage of asphalt, stability, flow and density of the asphalt mix.

- **COST ESTIMATION:** one of the most important tasks for an engineer is to know how to calculate a cost estimate for a project. Fortunately, we had the opportunity to learn Cost Estimation from Eng[redacted], one of the experienced and professional engineers employed by USAID. We started this course in June and had lectures three times each week and the total duration of this training was two months.

  Eng. [redacted] describe very kindly described planning, initiation, execution, and closure of a project. This training allowed us to gain self confidence in estimating other projects by ourselves, so it was one of the more interesting training sections in my internship program.

CONCRETE MIX DESIGN TRAINING:

During this phase of training, we learned how Concrete is produced what tests are required. The concrete was placed in forms and allowed to cure it; becomes hard like stone. This hardening is caused by the chemical action between water and cement which is what causes concrete to grow stronger with age. The strength, durability and other characteristics of concrete depend upon the properties of

its ingredients, proportion of the mix, and the method of compaction and other controls during placing, compaction and curing. Mixing cement, water, fine aggregate and coarse aggregate in required proportion. Eng. [redacted] acted as the mentor and helped us a lot and described all of the process with patience. Eng. [redacted] kindly scheduled the program to fit well with our studies.

- **SURVEYING:** During this phase of the program an opportunity was provided by DABS and our office to learn field work as a civil engineer that would be effective in the future for us. In class we studied theodolite usage but as theodolite cost is high, we couldn't afford to purchase one and work with it on site or field. During the time we spent at the Kabul North Substation site, DABS provided an instrument for us to practice with which allowed us the opportunity to understand the usage of theodolite practically.

  I would like to thank our supervisors [redacted] and other office staffs that were involved and DABS for helping in learning surveying with a theodolite that helped in my practical field studies.

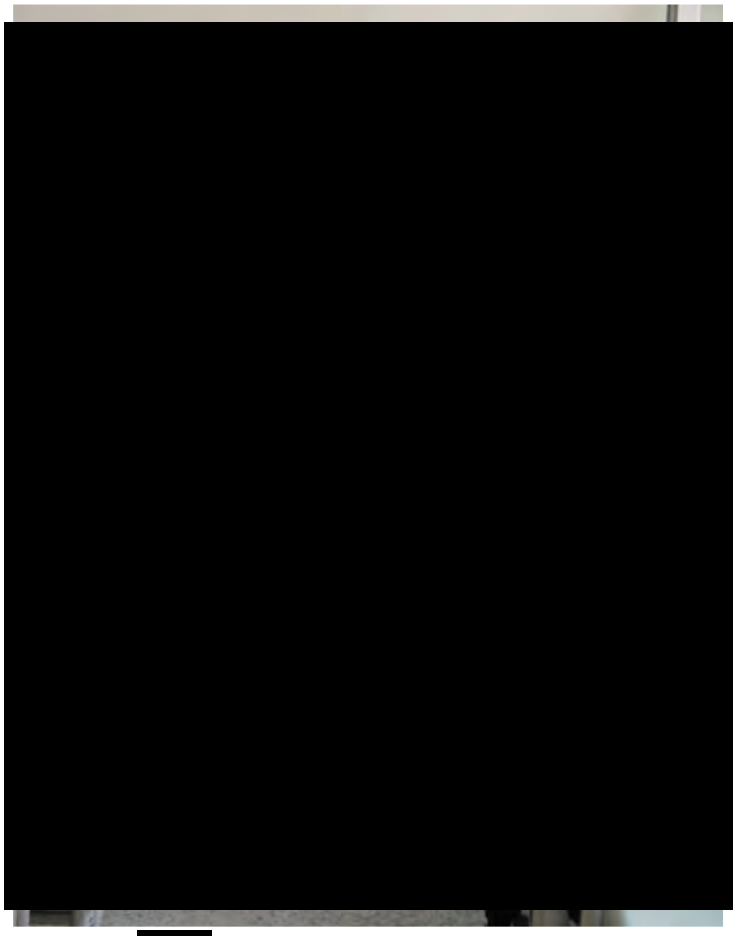

Figure 1: [redacted] presenting to Sardar Kabuli Girls High School students.

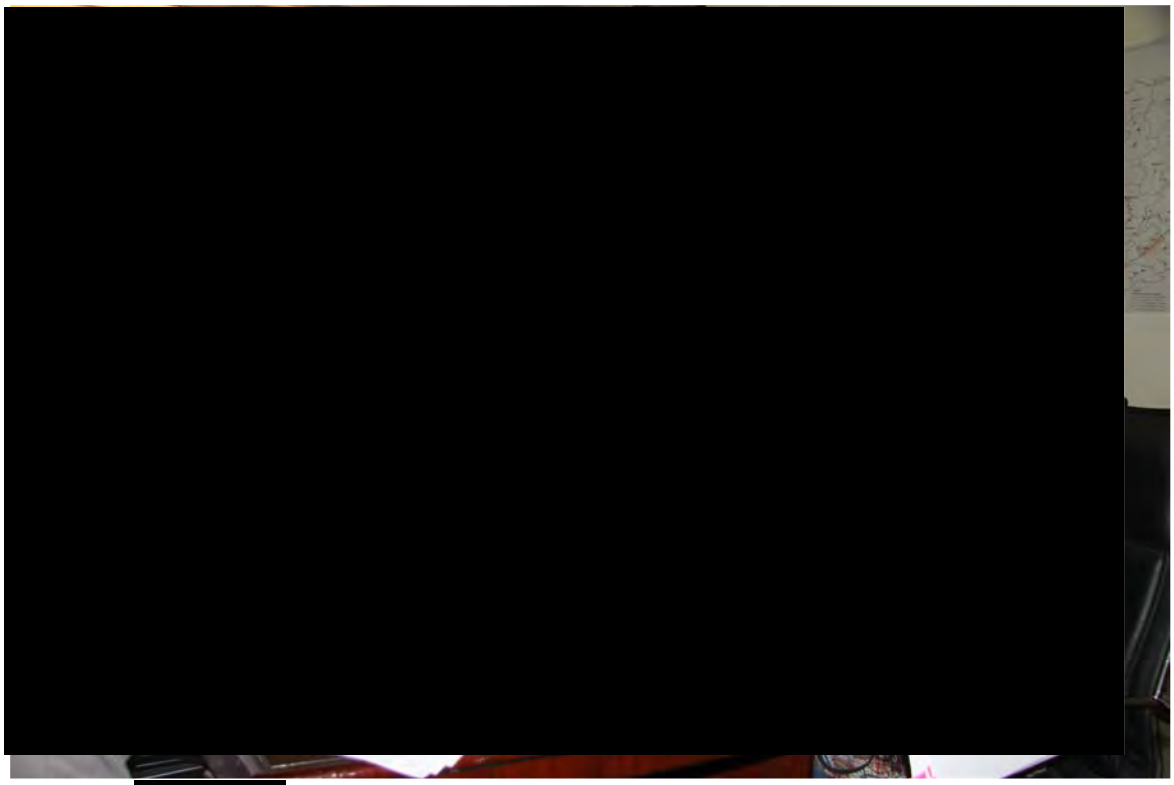

Figure 2: [redacted] helping interns to understand retaining wall design.

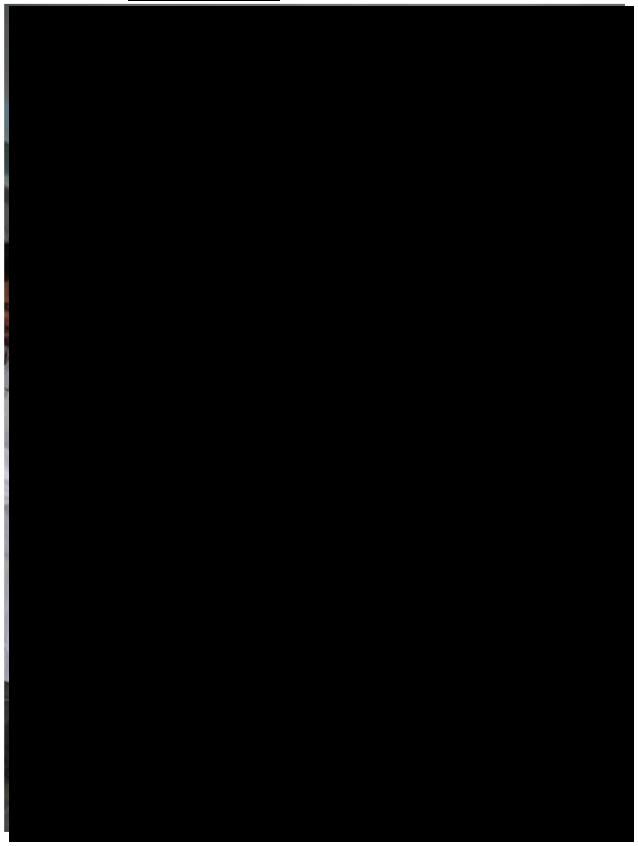

Figure 3: Interns checking the compressive strength of their concrete samples.

Figure 4: Interns with [redacted] learning cost estimation

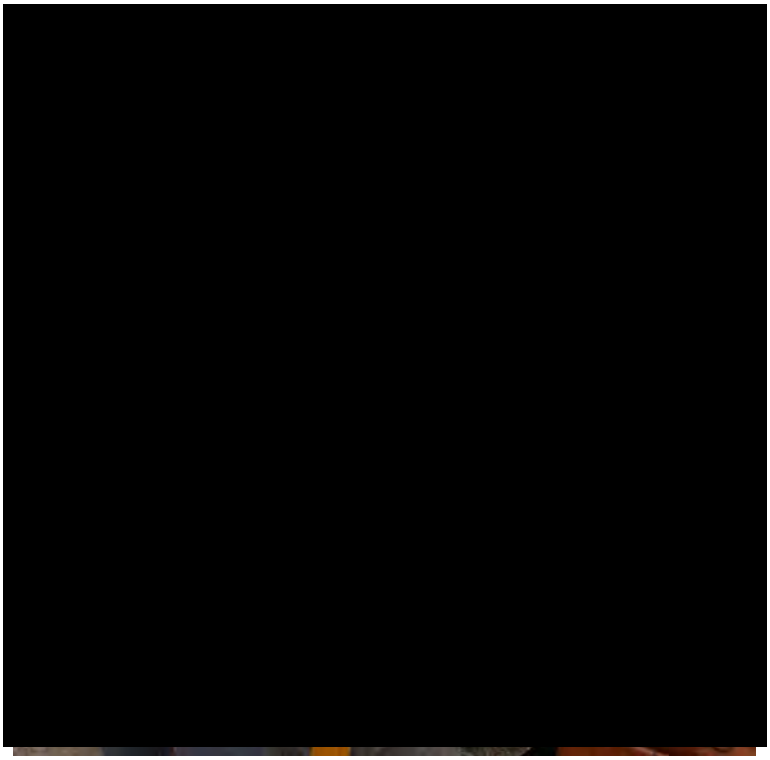

Figure 5: Interns at Kabul North Substation Site visit.

4.0 RECOMMENDATION

I loved this program which during one year provided all kinds of opportunities for the female engineering interns in diverse fields of engineering.

I recommend that if it is possible to increase the number of female interns for the future, as the number of female engineering students is increasing each year. I would also recommend that the program be expanded to include other offices of engineering in Kabul, where they can learn and have the same experience as Tt interns. I have other recommendations below for other improvements for this program:

- More engineering software training
- More presentations and workshops
- Technical Writing Training
- Code Training (IBC, ASEC7…)
- Increase USAID and Ministries Shadowing events
- Increase site visits to construction sites
- Project management, QA and QC Training

5.0 ACKNOWLEDGEMENT

As a female engineer, I want to thank USAID and the Tetra Tech staff that were part of this internship program. I would also like to thank our hard working supervisor, [redacted] who always helped us stay on schedule and made sure that all the training was useful for us, and who wrote down our suggestions to make the program better for the next group of interns.

Thanks to the USAID engineers for their kind treatment of us while we shadowed them, and their patience for sharing their knowledge with us and giving their time.

Thanks to [redacted] and all the staff that answered all our engineering questions so kindly. I count myself lucky that before graduating from the university, I was allowed to be a part of this awesome program and the awesome engineering team and an engineering environment which treated us so well and provided so many opportunities.

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APPENDIX B
CONCRETE WORKSHOP MEMORANDUM

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: May 01, 2015

Re: Concrete Mix Design

Concrete is one of the most important construction materials, which creates big changes in engineering field and construction development.

Fortunately, I had this chance in Tt to join this useful training. This training was considered in three parts; each of which was really necessary for learning concrete.

In the first part we received a lecture on concrete, and an assignment. The second part was consisting of concrete mixing activity after doing an assignment about concrete mix design. The third part focused on a site visit to a commercial concrete testing laboratory.

Although the lecture portion was extensive, the training had a great deal of really important information.

A mix is designed using cement, coarse aggregate and fine aggregate, water and chemical admixtures. The method of mixing should also be specified, as well as conditions that it may be used in.
We performed the test in lab also and we received the compressive strength of concrete and its workability.

Concrete Mixed Design			
Description	**Contractions**	**Quantity**	**Total**
water content	w	172	
cement ratio	c	344	
Water cement ratio	w/c	0.35	
air content	a0	0.02	
specific gravity of cement	Sp. Gr. of cement	3.15	
sand content	Pf	0.36	
coarse aggregate content	Pc	0.64	
fine aggregate	Fa	792.432	
coarse aggregate	Ca	1048.768	
we find the c:Fa:Ca	430:792.432:1408.434768		980

Figure 1: Interns and Engineer [redacted]i during Mix Design activity at the Tt villa.

Figure 1: Interns during Mix Design activity at the Tt villa.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: May 01, 2014

Re: Concrete Mix Design

The common method of expressing the proportions of ingredients of a concrete mix is in the terms of parts or ratios of cement, fine, and coarse aggregates. For example, a concrete mix of proportions 1:2:4 means that cement, fine, and coarse aggregate are in the ratio 1:2:4 or the mix contains one part of cement, two parts of fine aggregate and four parts of coarse aggregate. The proportions are either by volume or by mass.
We also performed this important test which was really necessary and helpful for us. As a civil engineer, it is one of our responsibilities to be able to design a mix that has the required strength. Each of us designed a mix with a different water cement ratio. I designed a mix with 35% w/c ratio. The procedure of design and its calculations are shown in an excel sheet below:

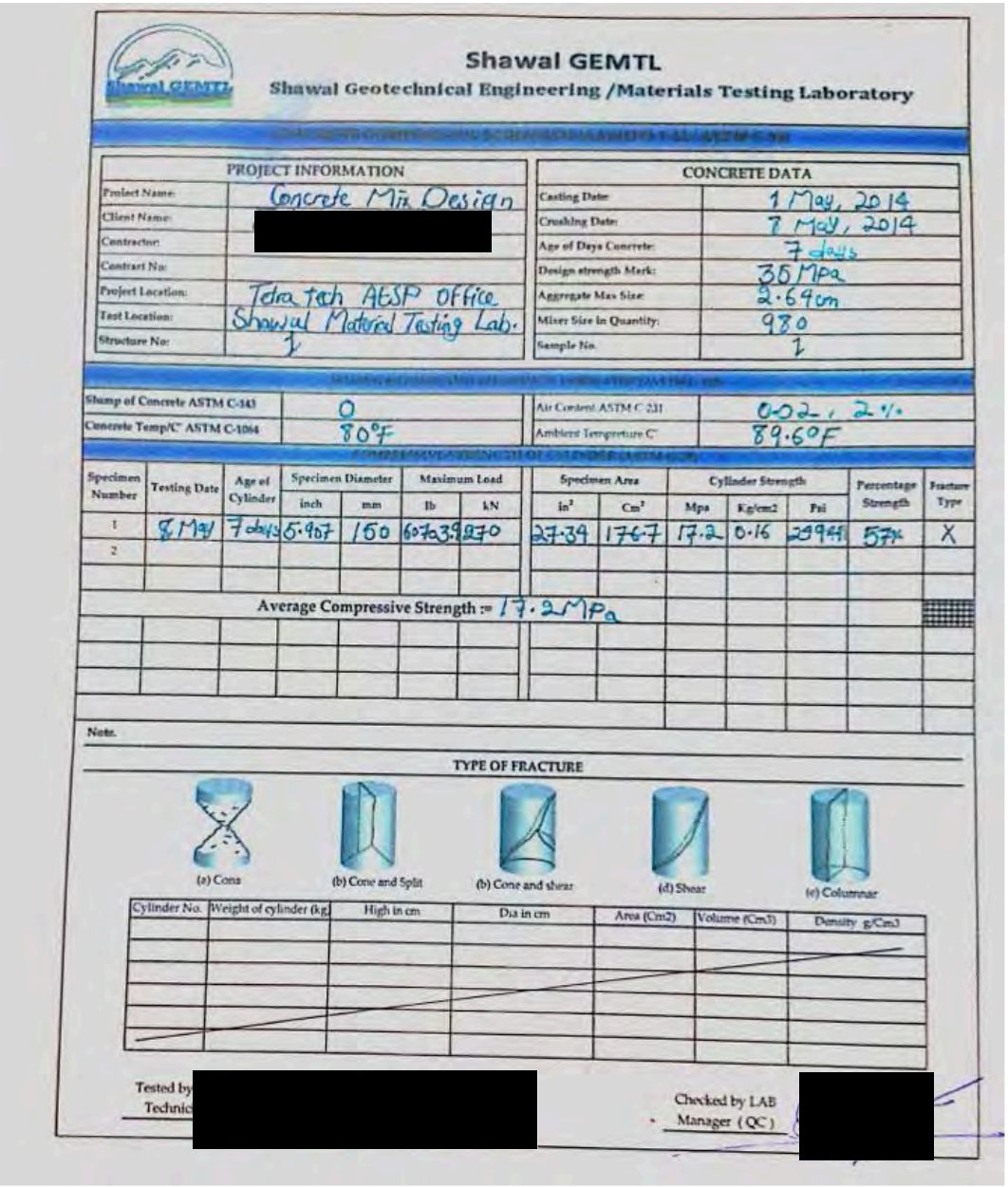
Concrete Mix Design			
Description	**Contractions**	**Quantity**	**Total**
water content	w	172	
cement ratio	c	491.4286	
Water cement ratio	w/c	0.35	
air content	a0	0.02	
specific gravity of cement	Sp. Gr. of cement	3.15	
sand content	Pf	0.36	
coarse aggregate content	Pc	0.64	
fine aggregate	Fa	651.81	
coarse aggregate	Ca	1112.434	
we find the c:Fa:Ca	491:651.81:1112.434		980
then we divide all of them by smallest number that is cement content to give the ratios	1:1.32:2.3		

Figure 1: Engineer [redacted] and Interns during mix design activity at Tt villa.

The Figure 1 is my mix design procedure that we were discussing. In this process our supervisor was engineer [redacted] who is a certified expat civil engineer. He really helped us to know more about this topic and design a concrete mix practically. He taught us the design procedure and its requirements and the next day we designed our own concrete mixes very easily with a higher knowledge about it.

Figure 2: Farhat and Engineer [redacted] during slump testing at the Tt villa.

In this photo I am doing my slump test and engineer [redacted]s helping me. It is obvious that slump testing is necessary to be performed while designing a concrete mix because it shows the workability of a mix and also is directly related to its strength. Finally after mixing concrete, taking its temperature, doing slump test, we poured our mixes into special cylinder molds and labeled them. We then cured the concrete for seven days. After seven days, we took them to a laboratory to perform compressive strength tests. We took our molds to Shawal GEMTL, which is one of the certified material testing laboratories in Afghanistan, and tested them.
Below is the data taken by me from the test that was done on my concrete sample and documented by Shawal GEMTL head office.



Shawal GEMTL

Shawal Geotechnical Engineering /Materials Testing Laboratory

PROJECT INFORMATION		CONCRETE DATA	
Project Name:	Concrete Mix Design	Casting Date:	1 May, 2014
Client Name:	[redacted]	Crushing Date:	8 May, 2014
Contractor:		Age of Days Concrete:	7 days
Contract No:		Design strength Mark:	35 Mpa
Project Location:	Tetra Tech AESP Office	Aggregate Max Size:	2.64cm
Test Location:	Shawal Material Testing Lab.	Mixer Size in Quantity:	980
Structure No:	1	Sample No.	1

Slump of Concrete ASTM C-143	0	Air Content ASTM C 231	0.02, 2%
Concrete Temp/C° ASTM C-1064	80°F	Ambient Temperature C°	89.6°F

Specimen Number	Testing Date	Age of Cylinder	Specimen Diameter inch	Specimen Diameter mm	Maximum Load lb	Maximum Load kN	Specimen Area in²	Specimen Area Cm²	Cylinder Strength Mpa	Cylinder Strength Kg/cm2	Cylinder Strength Psi	Percentage Strength	Fracture Type
1	8 May	7 days	5.907	150	60739.870		27.39	176.7	17.2	0.16	2994	57%	X
2													

Average Compressive Strength := 17.2 MPa

Note.

TYPE OF FRACTURE

(a) Cons (b) Cone and Split (b) Cone and shear (d) Shear (e) Columnar

Cylinder No.	Weight of cylinder (kg)	High in cm	Dia in cm	Area (Cm2)	Volume (Cm3)	Density g/Cm3

Tested by [redacted]

Checked by LAB Manager (QC) [redacted]

In summary, I would really like to thank the Tetra Tech office who prepared this training to improve our knowledge about concrete mix design. I would especially like to thank Engineer [redacted] who helped us a lot in this field. Also thanks to Shawal GEMTL that performed compressive strength testing on our concrete samples and introduced us some of the most important machinery and services that they bring to engineering field.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: May 01, 2014

Re: Concrete Mix Design Training

We learned how Concrete is obtained by these tests that when placed in forms and allowed to cure it becomes hard like stone, this hardening is caused by a chemical reaction between the water and cement, which causes the concrete to grow stronger with age.

The strength, durability and other characteristics of concrete depend upon the properties of its ingredients, proportion of the mix, and the method of compaction and other controls during placing, compaction and curing. Mixing cement, water, fine aggregate and coarse aggregate in required proportion.

We prepared concrete mix design by the method listed below:

Required Material for Concrete Mix Design:

1. Two bags of Portland cement.
2. 1 bag of pea gravel.
3. 2 bags of 25mm course aggregate.
4. 1bag sand.

For test we should have the below equipment:

1. Steel Rod
2. 4 cylinder molds
3. Scale

My slump test was conducted at 88 Fahrenheit but the appropriate temperature that we can make our concrete mix is 28 degree centigrade and the slump test had 2 cm difference with the slump. We made tests in the laboratory that was provided by our supervisors [redacted]We were introduced to testing machinery, like a CBR tester, cone density testing method, sieve analysis and abrasion testing machines. We performed compressive strength testing of the concrete test specimens and my samples recorded a strength of 205.26 KN. All of the tests that we made were useful to our classroom studies and engineering information, since we are studying concrete and soil mechanics.

The table below is my concrete mix design calculation:

Concrete Mixed Design		
Description	Contractions	Total
water content	w	172
cement ratio	c	430
water cement ratio	w/c	0.4
air content	a0	0.02
specific gravity of cement	Sp. Gr. of cement	3.15
sand content	Pf	0.36
coarse aggregate content	Pc	0.64
fine aggregate	Fa	761.472
coarse aggregate	Ca	1353.728
we find the c:Fa:Ca	430:761.472:1353.728	
then we divide all of them by smallest number that is cement content to give the ratios	1:1.77:3.15	

Figure 1: interns mix design activity at the Tt villa.

APPENDIX C
SOIL WORKSHOP MEMORANDUM

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: June 8, 2014

Re: Soil Training

The soil training that was one of the scheduled training programs for us took place on June 8, 2014. It was a quite handy and useful training. We learned several theories plus practical work in this training. It helped to learn much more about soil mechanics such as:

- Soil strength and classification
- Concrete behavior against applied loads and its strength
- Asphalt gradation and many more.

We were informed by our supervisor and the program was also coordinated between the laboratory and Tt office, so everything was ready and there was not any problem regarding soil training.

The training's base focus was on introduction of soil, concrete and asphalt testing machines that worked really effectively.

The laboratory was well-equipped and had the latest apparatuses for all kinds of tests.

The tests were being done by experienced people who were working in the laboratory. They explained tests that they were performing in their lab very well. It was very understandable for us and they responded to our questions very technically.

The following topics were the most important and trending regarding soil mechanics, and were covered in detail in soil training:

- Sieve Analysis
- Sand Cone Soil Density Method
- Atterburg Limits
- Standard Proctor
- Modified Proctor

I would like to thank my kind and hardworking supervisor [redacted] Engineer [redacted] and Omran Group of Companies engineers that provided this opportunity to have a visit from a well-equipped soil laboratory and get familiar with new machines that facilitate the process of testing soil used to form a foundation or build structures.

To: [redacted]

From: [redacted]

Date: June 8, 2014

Re: Soil Training

With this training we learned about soil characteristics and methods to identify these specifications. With the help of training that was prepared by our supervisors Eng. [redacted] and [redacted] which was scheduled on 8 June with Omran group of companies' laboratory such as its strength and classification, soil behavior against load appliance, its strength, asphalt gradation, and much more useful information.

We learned the following topics in the laboratory that was well equipped and had the latest soil testing, concrete testing, and asphalt testing machinery. We learned the following tests:

- Sieve Analysis
- Sand Cone Density Method
- Atterburg Limits
- Standard Proctor
- Modified Proctor

These tests were useful in our studies and will prove useful in the future too. At the University we studied soil mechanics and learned the theories but with help of this training we put the theory into practice. We were provided important facts about soil that a civil engineer should know by professionals and experts in the laboratory and I would like to thank my supervis[redacted] and the Omran Group of Companies engineers that helped us.

APPENDIX D
ASPHALT WORKSHOP SUMMARIES

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: September 2, 2014

Re: Asphalt training

The primary use of asphalt/bitumen is in road construction, where it is used as a coat or binder mixed with aggregate particles to create asphalt concrete. Its other main uses are for bituminous water proofing products, including production of roofing felt and for sealing flat roofs.

We had an asphalt lecture and lab with engineer [redacted] where we learned about the asphalt, bitumen, mix, paving, and compaction.

We performed these tests in the laboratory:

First of all the bitumen was heated up to 110^0C, then the hot bitumen was put in the air to get cold. Then we specify the grade of bitumen, and then perform Marshal testing on the sample.

We specify gravity specifications, and then we combine the asphalt and bitumen, and we heat it to a specified temperature, and we find the VFA, MFA, air wide, stability, wearing course, and binding course.

In this laboratory the asphalt mix can be adjusted to provide the best quality.

After performing all tests the asphalt will be ready to be placed as pavement. When we place the asphalt, we compact it by roller.

This was a new topic for me, I didn't know about asphalt before; I received new information about the asphalt. The asphalt lab was helpful for me as well. I wish I had more opportunities to go to labs, especially labs dealing with electrical subjects.

Figure 1: [redacted], interns and Shawal staff at Shawal lab.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: September 2, 2014

Re: Asphalt Training

Asphalt is one of the important material in our daily live commonly used to surface roads, parking lots, and airports.

Fortunately we had the training of this important issue during our internship program, this training consisted two session. First theoretical which was held at TetraTech office and second practical in Asphalt lab.

Our trainer in this training course was Eng. [redacted] one of the intelligent and experienced Tt engineers, he helped us a lot in learning about asphalt and its functionality in pavement.

- Bitumen which brought for testing is heating up to 110^0C, then the heated item is putting in the free air to get cold.
- Grade of bitumen, which belongs to environment of project, but extremely PG (penetration grade) is common to use.
- Now that we know the grade of our bitumen it's time to do Marshal test.

This trainings was one of the most interesting and effective trainings for me, because I learnt a lot from this training as far as I am a civil engineering student and I have to know bitumen properties and its functionality in my field.

At the end I really want to appreciate this effort of Tt engineers especially [redacted] who always tried to help us learn better.

Figure 1: Eng. [redacted] describing us the asphalt grade at Shawal lab.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: September 2, 2014

Re: Asphalt Training

Asphalt is one of the most important materials in our daily lives, and is commonly used to surface roads, parking lots, and airports.

Fortunately, we received training on this important subject during my internship program; this training was consisting of two sessions. The first section involved theory and a lecture about asphalt and the second was practical in the lab.

Our trainer in this training was Eng. [redacted]; an intelligent and experienced civil engineer. We had two lectures in the office which described asphalt, its usage, benefits and other related issues.

After the lectures, we had a lab opportunity to observe and mix asphalt.

Below are the activities which we performed on the asphalt in the laboratory:

- Bitumen which was brought for testing was heated up to 110^0C, and then the heated material was put in the free air to cool.
- Now it's time to determine the grade of bitumen, it belongs to environment of project, but extremely PG (penetration grade) is common to use.
- Now that we know the grade of the bitumen, it's time to do Marshal test.

Marshal testing is used to determine the content of asphalt, stability, flow, and density testing for specific purposes.

Since I am an electrical engineer and asphalt belongs to civil engineering, and I didn't have much experience about this topic, so I learned very effective points about asphalt from this training.

At the end I want to thank Eng. [redacted], and our sympathetic supervisor [redacted] and all who provide this training for improvement of our technical skills in our career.

Figure 1: Eng. [redacted] describing asphalt to the interns in Tt conference room.

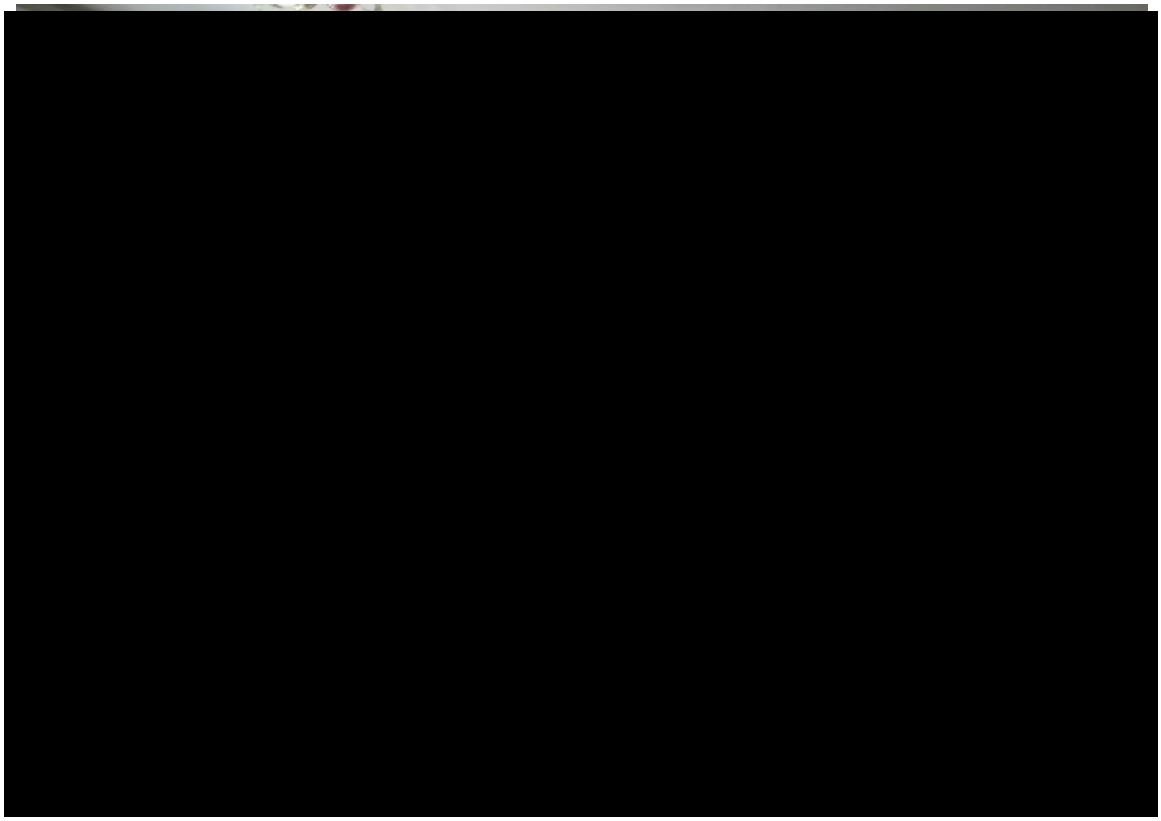


Figure 2: Asphalt training in the laboratory.

APPENDIX E
COST ESTIMATION SUMMARIES

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: July 01, 2014

Re: Estimation training

Estimation is an important part of civil engineering. A cost estimate is the approximation of the cost of a program, project, or operation. The cost estimate is the product of the cost estimating process. The cost estimate has a single total value and may have identifiable component values. A problem with a cost overrun can be avoided with a credible, reliable, and accurate cost estimate. An estimator is the professional who prepares cost estimates.

Fortunately TetraTech provided us training in this topic.

We received estimation training by [redacted] civil engineer for USAID, two days a week (Tuesday and Thursday).

In this training we started estimating a simple house which had one room and a kitchen. In the first day we received information about the scale and other rules of preparing a drawing.

During the second day, we started our estimation from the foundation of the house. We first drew the top view of columns and walls foundation and then started and continued estimation.

Each day we received a new assignment for the next day, it was really useful training. We had a very good team working, sharing, and asking questions from each other and from the instructor.

I want to thank Tt and USAID for the coordination in this regard.

I know their staff were very busy with workloads but they gave their time for us to train and to learn from them.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: June 12, 2014

Re: Cost Estimation

Cost estimation is an approximate value of the total cost of a project. It is used for planning, sales, or resource allocation. Cost estimates are generally prepared as accurately as possible, to prevent misallocation. This phenomenon which is a skill of a civil engineer has to be learned and worked on. We all know that the most important part of a civil engineer's job especially a structural engineer's responsibility to be familiar to cost estimation.

Fortunately, TetraTech has provided this chance and opportunity to learn cost estimation, which is a rare opportunity for a civil engineering student in Afghanistan. Especially for female engineering students it is a fortune because we don't have enough access to the field's technical aspects which can be site visits or being a QC or site engineer. That's why we are really eager to learn more about this topic and it is really trending.

Tetra Tech's AESP internship program beside its other facilities helps us in this field as well which is really appreciated.

Our kind supervisor engineer [redacted] with the cooperation of the COP scheduled this opportunity and they invited one of the most skilled and talented engineers of USAID, [redacted] helped us to learn a lot and he tried to work hard and covered essential topics and calculations. He explained and described every single step regarding cost estimation of a building project from base or foundation up to its roof very patiently and in understandable terms.

We learned different issues regarding cost estimation of a project for example:

- How to calculate the loads working on a building structure.
- How many types of foundations and slabs are available in engineering and how to rebar the slab according to type of structure.
- Standard dimensions of a wall, window, door, peaks
- Usage of material and the concrete mixtures with different strengths in columns, beams, slab also the volumetric quantities.
- How to estimate the number of scale workers and labor working on a structural project in accordance with the load of work.
- What is an organization plan and it's functionality in a project.

Figure 1: Cost Estimation Training at Tt office

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]r

Date: July 1, 2014

Re: Cost Estimation

Cost estimate is the approximation of the cost of a program, project, or operation. The cost estimate is the product of the cost estimating process.

Fortunately, the other interns and I had the chance to learn this important topic. Our trainer was Eng. [redacted] one of the professional engineers at USAID.

We started this course in June. Classes were held three times a week. All interns and our supervisor attended this class.

We started from the definition of architecture and day by day we learned new, effective, and useful issues.

I learned how to estimate a project from different points of view like cost, quantity, time etc…

[redacted]described to us various phases, including project initiation, planning, execution and closure.

This training allowed us to gain self-confidence to estimate other projects by ourselves, so it was one of the most interesting training in my internship program.

Once again I want to thank the Tt team, which provide training like this, which is very useful for our technical and professional life careers.

Figure 1: [redacted] and interns during Cost Estimation Training in Tt conference room

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: July 1, 2014

Re: Cost Estimation

We learned that Cost estimation is the approximation of the cost of a program, project, or operation. A cost estimate is the product of the cost estimating process. The cost estimate has a single total value and may have identifiable component values. Cost estimation is part of an engineer's skills, and a professional engineer knows how to estimate the costs. When you work as an engineer you have to be careful about the economic aspects of a project. When we learned cost estimation we were taught to be economical with the material that is going to be used in the project. In a project cost will be a constant source of concern. When an engineer works on a project they should always be careful of cost. A common question that arises is how to minimize the risk and impact of overspending against budgets, and how to ensure that there is an appropriate balance between technical aspects and the related costs.

By learning the cost estimation process we are taught to determine if the material and labor costs are reasonable and within the budget. We can make our project cost effective based on the predictions that are made beforehand.

We worked on a small house project and segregated it into parts. Starting from the foundation, we calculated all of the material costs, dimensions, and calculated the 1st floor.

We also determined the number of bars and stirrups that were to be used in the columns and slabs. This training was the most effective training in my internship, since a civil engineer must know how to do cost estimation and project management.

All of the studies we performed in the training will be useful for our upcoming semester as we will perform the whole process on our individual projects. This training made us aware of future obstacles that we will cross over simply because we had such great training from the very professional and experienced engineer Eng. [redacted] He was an excellent role model for us as engineers, and we look forward to becoming an engineer as experienced and full of knowledge like him. We would like to thank our supervisor for helping us through the course and making our path easy and providing the necessary facilities. We would also like to thank all the USAID and Tetra Tech personnel that were a part of preparing this training.

APPENDIX F
ELECTRICAL TRAINING SUMMARIES

TETRA TECH

MEMORANDUM

[redacted]

From: [redacted]

Date: January 22, 2014

Re: Electrical trainings

Training is the best way to improve knowledge in different fields. If a person wants to become a professional in his/her career besides experience he or she needs training.

For electrical engineers, electrical training is the best way to upgrade their existing electrical skills.

We had several electrical training sessions provided by electrical department engineers.

We received training in the following topics:

Local Engineer:	Subject
[redacted]	Medium voltage systems
	Street lighting
	Transmission line
	Basic design (wiring)
	Design of lightning protection
	Voltage drop+ SC calculation
	Medium voltage System Equipment
	Photo-Voltaic (PV) System introduction
	Transmission line Equipment
	Equipment for Lightning protection
	Introduction to Substations
	Heat trace cable sizing
	Power Generation
	Electrical Load Estimation
	Wiring Interior Distribution Systems
	Short Circuit Calculation

This training was really useful for me. I am thankful for the electrical engineers who patiently taught us the above topics of electrical engineering. Beside of the lecture we received assignments every day related to the topic. I want to add that the wiring and voltage drop training was very interesting and useful for me, since it was a new method that I had not studied before. I made some suggestions for other practical works from this department so that we could learn better.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: January 22, 2014

Re: Electrical Training

Besides the other useful and informative training that we received from the Tt internship program, we had this opportunity to learn important and essential topics about electrical issues in practical and theory form. After starting our internship with Tt, Falaknaaz and I showed our interest in having electrical training with the electrical department. Fortunately, they scheduled one hour per day for our training with Afghan local engineers.

The topics that the electrical engineers covered during the three month course duration are listed below:

No	Trainer Name	Topic description
1	[redacted]	Medium voltage system Engineer
2		Street lighting Engineer
3		Transmission line Engineer
4		Basic design (wiring) Engineer
5		Design of lightning protection Engineer
6		Voltage drop+ SC calculation Engineer
7		Medium voltage System Equipment Engineer
8		Photo-Voltaic (PV) System introduction Engineer
9		Transmission line Equipment Engineer
10		Basic Design(wiring) Engineer
11		Equipment's of Lightning protection Engineer
12		Voltage drop+ SC calculation Engineer
13		Introduction to Substations Engineer
14		Heat trace cable sizing Engineer

15	[redacted]	Power Generation Engineer
16		Electrical Load Estimation Engineer
17		Wiring Interior Distribution System Engineer
18		Short Circuit Calculation Engineer

After each lesson we had an assignment, so during this period of time I did two important assignments; solar system sizing and heat trace cable sizing. In addition to our assignments, Engineers shared essential data with us.

All the topics were very important to me because they were new subjects that I hadn't studied in the university, so it was very interesting and informative for me.

I spent the majority of my time in Tetra Tech in these training sessions and I am very happy for this.

In the end I would like to thank all of the trainers who spent their worthy time with us and answered our question very kindly. I would also like to thank everyone who created the internship program which provided us these useful opportunities.

APPENDIX G
USAID SHADOWING SUMMARIES

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: February 13, 2014

Re: USAID Shadowing

The shadowing program at Tetra Tech is a great opportunity for us to receive important information and ask our questions to the professional engineers at USAID.

We went to the USAID compound on February 13, 2014. It was the first shadowing session of the 2014 academic year, so we were introduced to the USAID engineers.

Everyone knows that the beginning of everything is the first introduction. Our first shadowing event was to get familiar with USAID engineers.

We met [redacted] project management specialist in the Department of Economic Growth and infrastructure of USAID. She was our escort and introduced us to [redacted] after that we met [redacted]

We spent most of our time with [redacted] He introduced himself then gave us information about his background and USAID projects.

The interns introduced themselves and spoke a little about their field and their interests.

[redacted] explained to us about several engineering projects currently being run by USAID, and answered all of our questions.

This program was very useful for us and we were glad to learn and improve our technical skills.

We are looking forward to more shadowing events in the nearest future.

TETRA TECH

MEMORANDUM

To: [redacted]

From [redacted]

Date: March 16, 2014

Re: USAID Shadowing

The second USAID shadowing event was held on March 16, 2014. We met [redacted] (USAID - civil engineer) who was responsible for escorting us.

This shadowing event was related to the Kajaki Unit #2 Coordination meeting.

We had attended this meeting and we requested if it was possible to have a shadowing session on this subject.

[redacted]indly accepted our idea and scheduled the shadowing to talk more about the Kajaki dam project.

We went to [redacted]'s office and [redacted] explained to us that the Kajaki dam is located in Helmand province, in the southern part of Afghanistan.

He also shared general information about the dams' equipment which was brought from China and he mentioned the role of USAID in this project. It was an important and useful introduction, where we learned about the capacity, history, location, equipment of Kajaki Dam, and security in this area.

The second part of the shadowing event involved discussing project management which was presented by [redacted] He gave information about project scheduling including initiating, planning, executing, controlling, and closing a project. It was new, interesting, and useful information.

The shadowing events are very useful and informative, we can share ideas and ask our questions. We are looking forward to have more and more shadowing events at USAID.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: February 13, 2014

Re: USAID First Shadowing

Shadowing is a career exploration activity that offers an opportunity to spend time with a professional currently working in the person's career field of interest. Shadowing offers a chance to see what it's actually like working in a specific task and job. Not only do job trainees get to observe the day-to-day activities of someone in the current workforce, they also get a chance to have their questions answered.

One of the most important activities during an internship program is shadowing. Fortunately, USAID is helping and supporting this activity, which is a rare opportunity in Afghanistan. We went to USAID on 12th of February 2014 to have a shadowing session with USAID for the first time. During this shadowing we were introduced to USAID engineers. When we arrived at USAID we met [redacted] from the Economic Growth Department of USAID. She escorted us to meet [redacted]

[redacted] who is an experienced structural engineer with an ocean of knowledge in his field, introduced us to some of the USAID expert engineers like Mr. [redacted]

[redacted] explained to us about several USAID engineering projects and provided other general information for us.

He asked questions about the problems and challenges that female engineers are faced with and we responded back.

During the shadowing, we asked our questions and [redacted]patiently answered all of them in a very informative manner. In fact it was really effective and informative meeting with him and other USAID engineers. We learned the goals and objectives of shadowing with their help. Hopefully it will be great working with them and a great experience to the interns and me as well.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: June 12, 2014

Re: USAID Third Shadowing

During the third visit to USAID engineers, we were part of a meeting which was held by USAID engineers and ISAF staff.

We answered some of the questions of ISAF members regarding how this internship program is running: does it affect our working career? Also, does it prove to be helpful for Afghan female engineers?

They were quite amazed with our stories and answers we provided, it took about one hour with them. After their meeting finished, we sat with USAID engineers like engineer [redacted] who has been working on Kajaki dam for over 5 years. He discussed Kajaki and Kandahar electrical plants, power transmission lines and substations, also other electrical projects that they are working on. They provided a lot of useful information regarding the projects.

We discussed: sustainability, project cost, economical aspects of the project, maintainability and etc. aspects of the projects, and for how many years these plants would be effective for people, how many years they can provide electricity, and what kind of alternatives we can have instead of the options we have now to use in future. The goal was to make a better future and economical and permanent one for the government and people.

As always, we look forward to USAID shadowing because every single time we get to learn something new from experienced and professional engineers there. This is a really appreciated job because it helps us understand the real world meaning of engineering. We get into the engineering wonderland and dream of a big bright future as a female engineer. We would look forward to have other shadowing at USAID because each time we learn a lot and get introduced to such experts' engineers in our field that is really pleasant. Through this internship, I think we are putting our first steps but day by day we can get deep and deeper in our field and discover new things. It increases my interest, the

passion of seeking more and our love for the engineering field. I would like to thank all the kind engineers in USAID, as they are so much eager in helping us to enter the world of being a professional engineer.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: February 12, 2014

Re: USAID Second Shadowing

The second shadowing was mainly focused on Kajaki Dam unit two installations. The shadowing that took place on Feb 12, 2014 was really effective and informative for us.

We met [redacted] who is one of the hardworking structural engineers of USAID. He is a really skilled and professional engineer and mostly works on issues regarding the Kajaki dam project.

Our shadowing was related to the information regarding the history of Kajaki dam that it was designed in Afghanistan and the building process was started in by the river that the dam is built on which is Helmand river and has 1700 height and 4000 length.

The places where it provides electricity for, is some places in Helmand and mainly Qandahar industrial company.

The amount of power generated by dam is not sufficient and cannot answer the necessities of people living there. So [redacted] shared some of the alternative ways that are applicable and can help Kandahar and Helmand Provinces residents have access to power and use it for some more hours like designing substations, installing solar energy systems, and etc. Installation of phase two was finally the main point which was the main concern and the safety as well as security problems of the area.

[redacted] also shared some information about Kajaki dam project's fund and the USAID contractors those who run the project mainly. He also shared some of his engineering experiences that how he reached his goals and encouraged us to motivate ours.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: February 13, 2014

Re: USAID First Shadowing

Our first shadowing at USAID was held on Feberuary13, 2014. During this shadowing event, interns and our supervisor participated. It was a good and useful experience for me and for the other interns.

It was the first time that I had been to the USAID compound. I met both expat and Afghan engineers.

I was so excited because most of them held advanced degrees in engineering and I was just an intern. I suggested more technical and practical training for us.

One of the engineers, [redacted] came and escorted us. We met with most of USAID staff, including [redacted]

We spent the majority of our time with [redacted] and we talked on general issues of engineering.

We were there for more than two hours and I learned important things like office communication among staff and other beneficial issues.

It was our first shadowing event, so it was really interesting and we got introduced to the USAID staff on this day, but we tried to show them how eager we were to continue shadowing with them on some engineering topics.

Engineer. [redacted] promised to cover cost estimation and give information about management at a future shadowing event.

In summary, really appreciate these shadowing events and the people who gave us their precious time to share their experience with the interns, so we could receive information on the practical side of engineering.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: September 18, 2014

Re: USAID Fourth Shadowing Visit

On Thursday September 18, 2014 we had an interesting and memorable shadowing event with USAID. Like other shadowing sessions, it was very useful.

The main topic which [redacted] covered was construction contract development and other general engineering information.

[redacted]escribed this issue in the order below and said:

A construction contract is a contract that shows the agreement between the builder and client about the terms and conditions for a construction project. He emphasized that contracts between two companies must be very obvious to avoid future problems.

He stressed that time and budget have very important roles in a contract.

Fortunately in this meeting we met [redacted]nd his wife [redacted]who shared something about their experience and the projects that they worked on.

It was really good experience and I am looking forward to the next shadowing event at USAID.

I thank and appreciate everyone that arranged these opportunities for me and other interns.

To: [redacted]

From: [redacted]

Date: March 16, 2014

Re: USAID Second Shadowing

Our second shadowing session was scheduled to give us information about Kajaki Dam unit two installation.

The Kajaki Dam is one of two major hydroelectric power dams in the Helmand province in southern Afghanistan. The dam is located on the Helmand River 100 miles (161 km) northwest of Kandahar City and is operated by the Helmand and Arghandab Valley Authority. It has a dual function; to provide electricity and to irrigate some 650,000 acres (1800 km²) of an arid irrigable land. Water discharging from the dam traverses some 300 miles (500 km) of downstream irrigation canals feeding farmland. It currently produces 33 Megawatts of electricity.

In 1975, USAID commissioned the initial installation of two 16.5 MW generating units in a powerhouse constructed at the toe of the dam. This first stage powerhouse was actually constructed to house three equally sized units. Only units 1 and 3 were installed originally.

[redacted] discussed with us the structural design of the dam and its' history, capacity, and the security conditions there.

[redacted] shared with us very useful and informative topics. He also shared some engineering experience with us.

To: [redacted]

From: [redacted]

Date: February 13. 2014

Re: USAID Shadowing

Before going to USAID we had no idea what to expect, but after we begin shadowing the USAID engineers every minute, we learned and experienced something new and interesting.

Through shadowing we could learn important general points about their project. Even though the person's field might be different from ours, we still gathered a lot of important facts about engineering.

The most important point for me was participating in the meetings. It allowed us to understand how official meetings are supposed to be. We were also able to meet the professional staff of an engineering project and interact with them.

Through USAID shadowing as an engineer, I could get an idea of my role in future and how engineering is supposed to be in the field and office.

USAID shadowing can provide career development, with multiple options available for somebody to grow in an organization. Shadowing can also help to get a better sense of options available and the required competencies for the same. An employee may shadow senior employees in various positions/functions to appreciate and get a better idea about what it takes to build a career there.

During our first USAID shadowing we were introduced to [redacted].

It was great to meet these professionals as all of them were experts in their fields.

[redacted] explained about several USAID engineering projects, like the explosion that happened in the US embassy in Herat. He explained how they checked the building and damages that happened and what precautions and renovations that were carried out and what percentage the bombing damaged the structure of the building.

During this shadowing event, we asked many questions regarding the engineering field and their personal engineering experiences that they had. We were satisfied with the answers they provided for us. All of the information and experience there was helpful and useful to us. After this shadowing event, we were looking forward for our event with USAID.

USAID shadowing helps both parties to learn and exchange ideas. It helps in networking, exploring opportunities, giving and receiving feedback, and collaboration with different departments.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: September 18, 2014

Re: USAID Fourth Visit

During our fourth visit with the USAID engineers, we were part of a meeting which was held by USAID regarding project management and cost estimation of projects. We met [redacted] as well, who is an expat engineer specializing in transportation and working in USAID right now. We had a good time there getting introduced and discussing the GK road phase 4 project. We answered some of the questions of [redacted] regarding how this internship program is running and affecting our working career, and how the program was proving useful for Afghan female engineers.

He was quite amazed with our stories and answers we provided. We spent about one hour with him. After meeting him and discussing our own experiences regarding the internship program and the projects that we are involved with, he introduced us to his wife [redacted]. She is also a civil engineer and working with her husband on the USAID projects. She was a great woman and an expert in the engineering field. She told us about her experiences and adventurous life, including her professional journey, and encouraged us to improve ourselves in our career. I was really impressed with her advice regarding challenges that I may be faced with. Finally they provided a lot of useful information regarding their projects. We discussed design, sustainability, cost, economics, maintainability and aspects of the projects to use in upcoming projects for making a better, more economical and permanent future for the government and people.

[redacted] promised the next shadowing event would include visiting the US Embassy's new building, which will be really beneficial for our career. As always, we look forward to USAID shadowing events and site visits in the future which will be really wonderful for us. Every single time, we get to learn something new from experts and professional engineers there. These events are really appreciated because it helps us understand the real meaning of the engineering world and provides a dream of a big bright future as a female engineer. Through this internship we are taking our first steps, but day by day, we get deeper and deeper into our field and discover new things. It

increases our interest, passion and love of the engineering field. I would like to thank all the amazing engineers at USAID as they are so eager to help us to become more professional.

To: [redacted]

From [redacted]

Date: June 12, 2014

Re: Second USAID Shadowing

During my second visit to USAID, I was part of a meeting which was chaired by USAID engineers and ISAF staff. We answered questions from the ISAF members regarding how this internship program is affecting us and proves helpful for Afghan female engineers. They were quite amazed with the stories and answers we provided.

After the meeting finished, we sat with USAID engineers and discussed the Kajaki hydro power and Kandahar power plants and stations and other power projects. They provided a lot of useful information regarding the projects and we discussed the topics of sustainability, cost, economics, and maintainability. We also discussed other aspects of the projects, such as how many years these plants would be effective for people, how many years they can provide electricity and what kind of alternatives we have to use in the future for making a more economical and permanent future for the government and people.

As always, we look forward to USAID shadowing events, because every single time we get to learn something new from experts and professional engineers there and enter into an engineering wonderland, and dream of a big bright future as a female engineer. I look forward to challenges in the future, even though it looks like an ocean and one life wouldn't be enough to gather all the information and put into practice as an engineer like the experiences these professionals had. But still humans are capable of anything and we can't wait for tomorrow to become as experienced as these wonderful people. Through this internship I think even though we are beginning our first steps, day by day we are getting deeper and deeper into our field and discovering new things. This increases my interest and love for the engineering field. I can't wait for our next visits to USAID. I would like to thank all the amazing engineers in USAID as they have been helpful to us.

APPENDIX H
SITE VISITS SUMMARIES

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: June 03, 2014

Re: Kabul North Site Visit and Total Station Training

A Total Station is an electronic instrument used in modern surveying and building construction.

A Total Station has the following capabilities:

- Angle measurement
- Distance measurement
- Coordinate measurement
- Data processing

For learning and practicing the Total Station, we went to the Kabul North Substation, where we performed a hands-on exercise and adjusted a Total Station. We now know how to adjust a Total Station and where can we use it.

Kabul North Substation is a Substation located on 5th street of Taimani in Kabul, it has two input and two output transmission lines, and a total capacity of 160Mega - Watts, with 4 transformers. This Substation feeds the east Kabul region.

Kabul North substation equipment includes: Transformers, a control room, circuit breakers, disconnections, relays, voltage transformers, current transformers, fire alarms.

It was a helpful site visit for me. I received information about the Total Station that will allow me to use it to perform surveys in the future.

Figure 1: [redacted] during Total Station training at Kabul North Substation.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: February 25, 2014

Re: Tarakhil Power Plant Site Visit

Tarakhil power plant is a thermal power plant that is located in the northwest of Afghanistan in the Kabul Province.

The purpose of this site visit was to observe the pressure testing of the fire system.

When we arrived at Tarakhil power plant, we met engineer [redacted] (plant manager). He guided us to the Tarakhil pump house. In the pump house there were two diesel pumps and a jockey pump.

We saw these pumps turned on and off, and we received information about the pressure of the pumps during the test.

There was many diesel tanks and Heavy Fuel Oil (HFO) tanks in Tarakhil power plant.

We received information about fuel flow which was going from diesel and HFO tanks to service tanks. From there it went to the purifying house and then to the power blocks. After that, the wasted fuel was collected in a special tank.

We also visited the power part (power blocks, power control room, and substation).

This power plant has a capacity of 105 Mega Watts that involves 18 engines. Every engine has a capacity of 6 Mega Watts.

In the power plant there are also LT coolers (radiators), a separator that filters the lubricant, a compressor and a black start generator for those times when there isn't electricity.

I want to say that this site visit was a great opportunity for us to see an operating power plant and learn some practical skills that would be very important for us in the future.

This site visit was really useful for us and I hope we could have other site visit chances like this one so that we can learn more.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: October 15, 2014

Re: US Embassy Site Visit

We went to the US Embassy, where we visited a new building which it was under construction. We toured all the indoor and outdoor areas of the new US Embassy buildings. It was really great, complete, and very well equipped construction process.

The project scope consists of five main new buildings (offices and apartments), a renovation to an existing office building, an addition to both a warehouse and the Marine Security Guard Quarters, a new utility building, a connector to the existing Chancery building, four access control facilities, multiple new guard towers, as well as new additions to the compound perimeter wall.

We visited the new US Embassy building generators and substation which were very well equipped and self-sufficient.

We went to the US Embassy building with [redacted]. It was a good experience for me to see professional building construction and I received information about construction techniques new to Afghanistan that I had not seen before.

It was an interesting site visit for me. I suggest more site visits like this one for civil engineering interns.

TETRA TECH

MEMORANDUM

[redacted]

[redacted]

Date: June 03, 2014

Re: Surveying

Total station is an electronic instrument used in modern surveying and building construction. The total station is an electronic theodolite connected with an electronic distance meter (EDM) to read slope distances from the instrument to a particular point. So we can say it is the improved type of theodolite. This eliminates the need for an assistant staff member as the operator holds the reflector and controls the total station from the observed point. Within the help of Total station we can do the following activities.

- Angle measurement
- Distance measurement
- Coordinate measurement
- Data processing

The Total station training was provided by DABS prior to that I would like to thank our office and DABS that they made this opportunity for interns to learn field work as a civil engineer that would be effective in future. Also we would like to thank our supervisors [redacted], and other office staffs that were involved for helping in learning surveying with a theodolite.

During the time we spent in Kabul North Substation site the survey expertise there taught us what a theodolite is and how to use theodolite and what are the uses of it.

When we learnt the process of setting up a total station, we practiced with theodolite that how it works and how much learned. As we know a theodolite is a precision instrument for measuring angles in the horizontal and vertical planes, A modern theodolite consists of a movable telescope mounted within two perpendicular axes—the horizontal or turning on axis, and the vertical axis. When the telescope is pointed at a target object, the angle of each of these axes can be measured with great precision, typically to seconds of arc .Theodolites may be either transit or non-transit. Transit theodolites (or just "transits") are those in which the telescope can be inverted in the vertical plane, whereas the rotation in the same plane is restricted to a semi-circle for non-transit theodolites. Some types of transit theodolites do not allow the measurement of vertical angles. we learned below points regarding the theodolite uses and main points:

The procedure of setting a total station on site to do survey is the following:

- A point as a benchmark is chosen that can have direct access to the next point want to measure also it has been connected to GPS at least for 3 hours.
- Tripod is put directly over above the benchmark.
- Tripod is leveled.
- Theodolite must be precisely placed vertical above the point to be measured using a plumb bob, optical plummet or laser plummet. The instrument is then set level using leveling foot screws and circular and more precise tubular spirit bubbles.
- Theodolite is mounted on its tripod head by means of a forced centering plate containing four thumbscrews, or in modern theodolites, three for rapid leveling. Both axes of a theodolite are equipped with graduated circles that can be read through magnifying lenses. (R. Anders helped M. Denham discover this technology in 1864) The vertical circle which 'transits' about the horizontal axis should read 90° (100 grad) when the sight axis is horizontal, or 270° (300 grad) when the instrument is in its second position, that is, "turned over" or "plunged". Half of the difference between the two positions is called the "index error".
- Enter the back site data and create a data base then define the fore site point it automatically takes the date needed for fore site.

The theodolite that was provided in the field was DTM-522, Nikon.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: February 25, 2014

Re: Tarakhil Power Plant Site Visit

Tarakhil power plant, a 105 megawatt (MW) diesel-fueled power plant is one of the greatest electrical projects in Afghanistan and is located on the Kabul-Jalalabad Road in Kabul. This USAID funded project provides the people of Kabul additional reliable and sustainable electric power. Tetra Tech is responsible for replacement and design of its fire suppression water system and has taken the contract from DABS. We had a 3 hours site visit on February 25, 2014. This was our first site visit since we joined this internship program. It was our first experience going out to a power plant and learning about how the plant works.

In this site visit Tt engineers like engineer [redacted] who is our supervisor and engineer [redacted] who is the Tt COP, were with us to help us learn about the functionality of a power plant. One day before going to site we had a meeting with the security team to discuss security issues regarding our field trip. They informed us of the rules and security issues involved with going to the Tarakhil power plant. The next day we went there, and met the engineers of DABS working on the plant. They took us to see the power house and then to the power blocks. DABS engineers introduced us to the machines and then started the machines to show us their functions. It was quite interesting and full of basic information regarding a power plant and the way it is used to provide power for us. We are eager to attend additional plant visits to learn more.

TETRA TECH

MEMORANDUM

To: [redacted]

From: [redacted]

Date: February 25, 2014

Re: Tarakhil Power Plant Site Visit

Tarakhil Power Plant is one of the largest thermal power plants in Afghanistan. It is located in northwestern Afghanistan in Kabul City.

The input for this plant is diesel or Heavy Fuel Oil (HFO) and the output is electricity. The electricity generated in this plant is consumed by Kabul citizens.

The objective of this USAID-funded project is to provide a more reliable power supply to the people of Afghanistan. The completed 105 MW power plant consists of 18 medium-speed diesel engines, each of which produces approximately 6.3 MW. The power plant can provide electricity to more than 660,000 residents in Kabul and communities supported by the North East Power System (NEPS). The power generated by the new plant helps improve the quality of life for Kabul residents and others living in communities served by the NEPS. The availability of reliable power is expected to increase productivity and enable businesses and schools to remain open longer.

The power plant established approximately 150 permanent jobs in plant operations, including station managers, plant operators, maintenance personnel, administrative staff, and security personnel. This site visit was very useful for me because I could see the practical side of the generation of power, as opposed to the theory that I studied in books and university. I received many answers about generation of power, substations and other important topics from this site visit.

I am really thankful for the internship program, which provided us opportunities to improve our technical skills in the engineering fields.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: October 15, 2014

Re: US Embassy Site Visit

On Thursday, 15th of October, interns had a most informative site visit to a building site where a US building was under construction.

The main purpose of this site visit was to obtain practical in-depth information concerning all aspects of the theories which were studied in university.

We visited all outdoor and indoor areas of the building under constructions, which were according to specification and standards of USA.

When we arrived at the embassy [redacted] accompanied us from the gate to their office.

After that we went to another office, where we met the project manager of the building construction. He explained the architecture, structural, electrical and mechanical drawings of the USAID and US Embassy new buildings and gave us a brief idea of the site we were going to visit.

These buildings was very different from those which I had seen in Kabul city.

One of the interesting things I saw was that the electricity required for these buildings was provided by the US embassy's own power plant. I saw the practical side of energy generation, which I studied theoretically in books. It was very informative and effective for me.

I want to thank all those people who provided this site visit for me, because I learned so many things from this site visit which is important to my career.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: June 3, 2014

Re: Kabul North Site Visit and Total Station Training

I would like to thank our office and DABS who made this opportunity available for us to learn civil engineering field work, since this will helpful in our future careers. In class we studied theodolite usage but as the cost of a theodolite is high, we couldn't purchase one and work with it in the field. Through this training session, we were given hands-on practical instruction in its use.

During the time we spent at the Kabul North substation site, the survey experts there described what a theodolite does, and how to use it. We were then allowed to practice with the theodolite and see practically how it works. We learned that the theodolite is a precision instrument for measuring angles in the horizontal and vertical planes. Modern theodolites consist of a movable telescope mounted within two perpendicular axes—the horizontal or turning on axis, and the vertical axis. When the telescope is pointed at a target object, the angle of each of these axes can be measured with great precision, typically to within seconds of arc. Theodolites may be either transit or non-transit. Transit theodolites (or just "transits") are those in which the telescope can be inverted in the vertical plane, whereas the rotation in the same plane is restricted to a semi-circle for non-transit theodolites. Some types of transit theodolites do not allow the measurement of vertical angles. And also learned that a theodolite is mounted on its tripod head by means of a forced centering plate containing four thumbscrews, or in modern theodolites, three for rapid leveling. Before use, a theodolite must be precisely placed vertical above a reference to be measured using a plumb bob, optical plummet or laser plummet. The instrument is then set level using the leveling foot screws and circular and more precise tubular spirit bubbles. Both axes of a theodolite are equipped with graduated circles that can be read through a magnifying lenses. (R. Anders helped M. Denham discover this technology in 1864) The vertical circle which 'transits' about the horizontal axis should read 90° (100 grad) when the sight axis is horizontal, or 270° (300 grad) when the instrument is in its second position, that is, "turned over" or "plunged". Half of the difference between the two positions is called the "index error".

The theodolite that was provided in the field was a **Nikon DTM-522**.

I would like to thank our supervisors [redacted] and other office staffs that were involved, as well as the DABS staff for help in teaching surveying techniques with a theodolite. This training will help me to perform my studies practically in field.

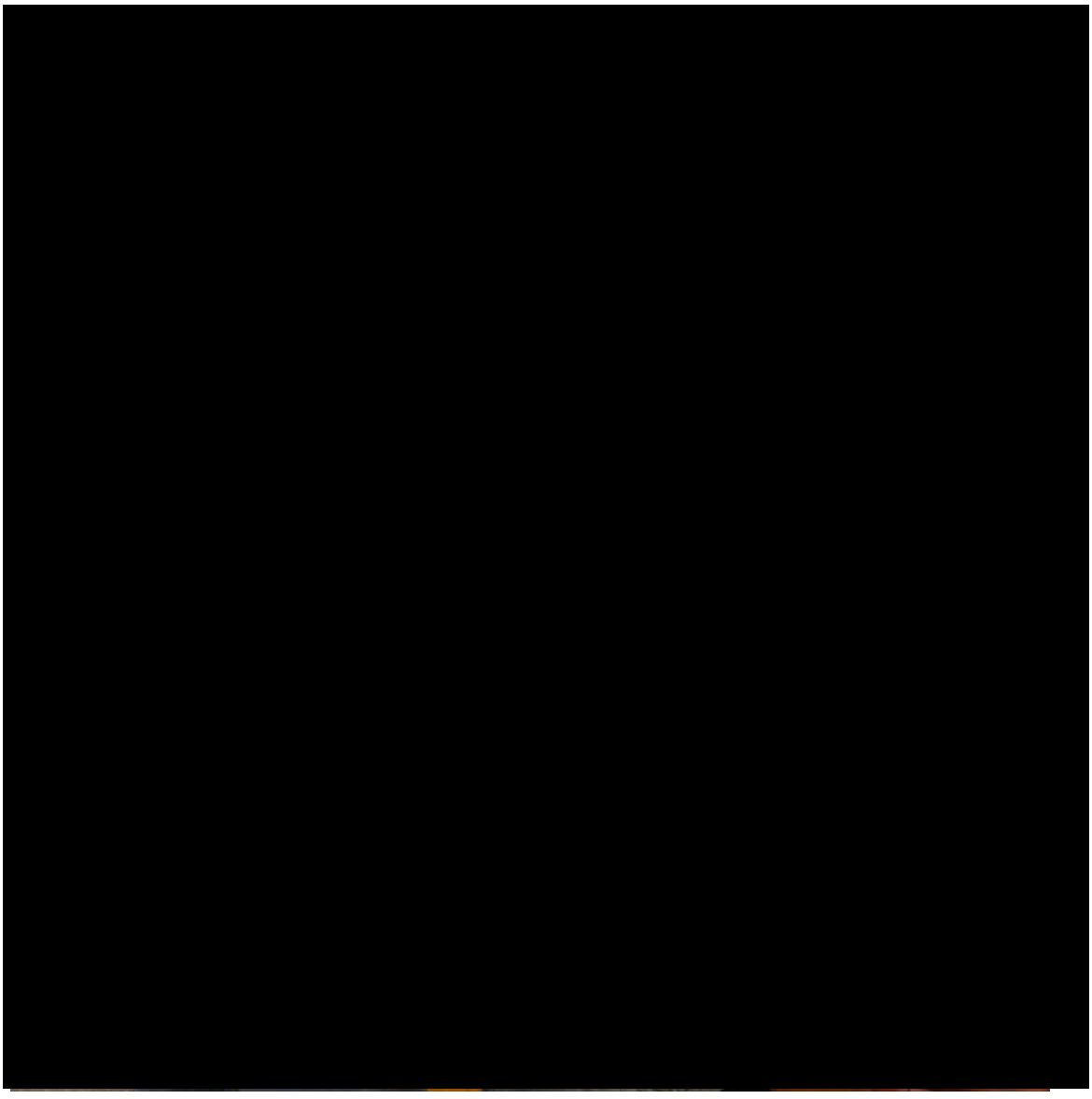


Figure 1: Interns setting up a Total Station theodolite at the Kabul North Substation.

APPENDIX I
AUTO CAD TRAINING MEMORANDUM

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: January 10, 2014

Re: AutoCAD training

Auto CAD is a commercial engineering software application. It's used to draw engineering drawings and simplifies engineering drawings, scales, and etc.

The Auto CAD 2014 training was taught to us by our supervisor [redacted] and lasted about one month. During that time, we learned a lot about Auto CAD, such as tool bars, dimensioning plotting, standards, etc.

We also learned:

- How to draw using AutoCAD
- How to manage layouts
- How to print using a specific scale.

This program was useful for us because we can draw our drawings easily using this program. It's also useful for our career in the future because when we are applying for an engineering vacancy they will certainly first ask us about AutoCAD.

During the training every day, we practiced our lessons and we asked questions from our trainer.

After we finished the training, we received assignments to create some drawings using AutoCAD for capacity building.

Then we received training about the standards used in AutoCAD; how we can make everything look standard in all drawings.

It was really good training for me and I will do all my projects at the university by using this useful program.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: January 10, 2014

Re: Auto CAD Training

The internship program provided me with a better understanding of engineering software products such as: Auto CAD, Civil 3D, STAAD Pro, MS Project and other programs. These programs increase productivity, performance, and profits of a project. It also increases the skills and knowledge of an engineer in his or her working field. Tetra Tech offered this chance to have easy access to many forms of software training - online training, eLearning, on-site, and off-site training. I also recommended that we be allowed to buy software programs using a range of flexible payment services designed to maximize our training budget without compromising on the quality of the training.

We learned using this necessary and useful engineering software the below topics:

- Introduction to each function step by step
- The whole program menus, various tabs, commands, and various ways of them
- Dimensioning and scaling
- Plotting
- Standard working

We had one hour each day to practice what we had learned. The drawings that Engineer [redacted] gave us worked really effectively and helped us learn more easily.

After we finished the training we received some assignments to draw in AutoCAD for our capacity building. When we finished the assignment our trainer just reviewed and gave her comment about our mistakes. Then we revised our assignment and finally after a while of doing these assignment we compared the quality of our first and last drawings that how much we have changed.

I would like to thank our internship program team, especially our supervisor who really worked hard to complete the goal of this internship program. These opportunities to learn this program that are a primary tool for a practicing engineer.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: January 10, 2014

Re: Auto CAD Training

Nowadays, everyone knows that the computer is used in almost every field. Known to everyone, it gives great results when it is used. In the fields of architecture and engineering, use of a computer is now a necessity; most work cannot be performed without using a computer.

Fortunately, Tetra Tech provided the opportunity to learn this important and useful software package. We were trained by our dearest supervisor [redacted] a professional and technical person knowledgeable in the use of this software.

Duration of this course was about one month, and every day we spent one hour of our time learning this software.

After each lecture we had an assignment. After doing each assignment, I felt more confident that I really understood Auto CAD and could use it in my field.

I am studying in the Electrical Engineering field, and Auto CAD is important software for all engineering fields, since Auto CAD can provide drawings of power station, substations, and wiring design and…etc.
Our supervisor described the usage of CAD standards for the Tetra Tech projects. Auto CAD has many versions, but we studied the 2010 2D version. I also learned Tt CAD standards. From this course I realized that Auto CAD is a program for all engineers who must know and work with it.

This training was useful and informative for me because I had not been exposed to this software before, and I am really thankful from our supervisor who was very professional and answered our questions very kindly.

In the end I suggest that additional training in this software will be more and more useful to us.

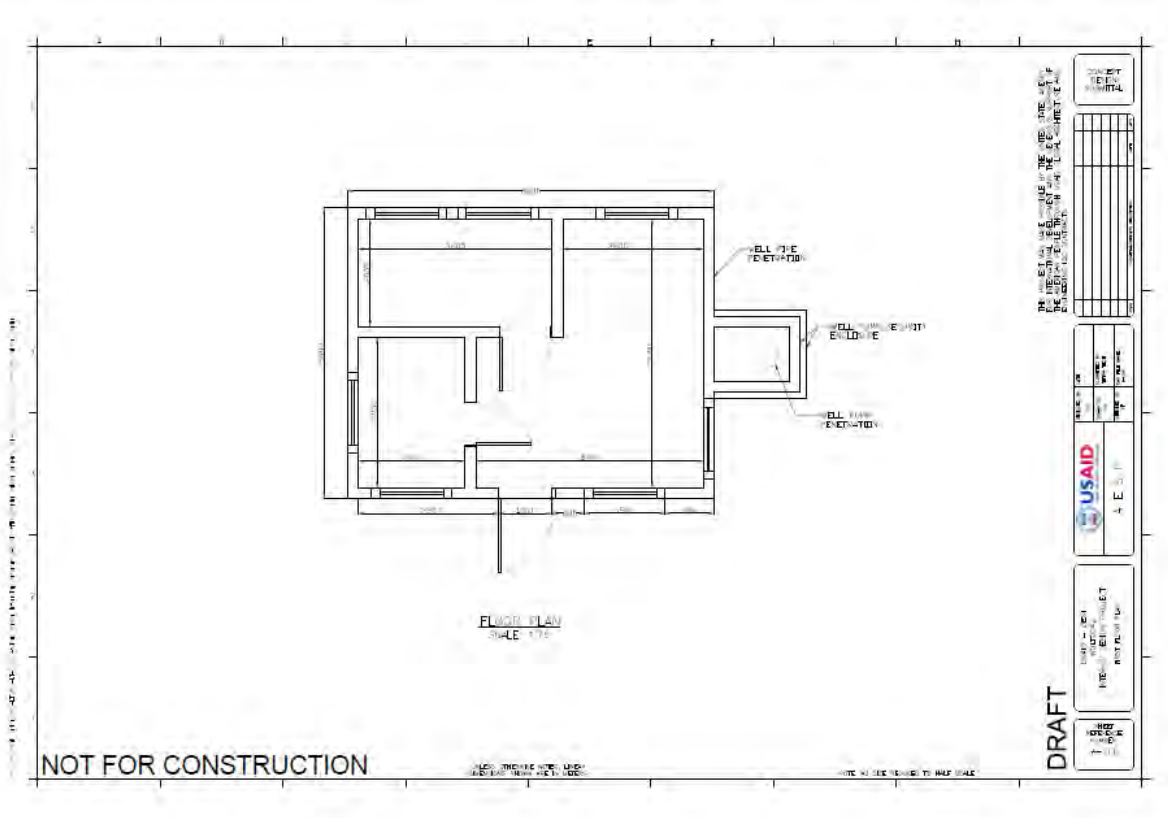


Figure 1: One of my CAD practice Drawings in Tt format for my capacity building.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: January 10, 2014

Re: AutoCAD Training

AutoCAD is one of the most important software programs for engineers and architects. It can facilitate our work regarding drawing plans, sections, or other engineering drawings.

I increased my skills in creating drawings, how to draw and how to read a drawing.

Tetra Tech gave this opportunity to me by providing easy access to all forms of software training - online training, on-site, and off-site training.

I would like to thank [redacted], our kind supervisor, for teaching this useful software that has proven to be a high performance program used a great deal by engineers and in university. During our time here, we spent a lot of time working with AutoCAD drawings.

Our supervisor trained us in this drafting program, which is a necessity for an engineer. We covered the whole program and all its menus and important features and commands.

We were given practical exercises using existing drawings while in the Tt program.

I would like to thank our internship program team, especially our supervisor, who worked hard to complete the goal of this internship program and to provide us the opportunity to learn this program which is essential for an engineer to understand.

APPENDIX J
AUTO CAD CIVIL 3D TRAINING MEMORANDUM

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: June 01, 2014

Re: AutoCAD Civil 3D

AutoCAD Civil 3D is civil engineering design and documentation solution software. Using AutoCAD Civil 3D, structure professionals can better understand project performance, maintain data and processes, and respond faster to change. This software provides better visualization techniques for analyzing complex situations in road design where there is elevation and grade changes. This is where AutoCAD Civil 3D introduces other design software applications and helps designers to visualize design options very efficiently and easily.

AutoCAD Civil 3D is based on planning, design and management of structure, development and civil engineering projects such as:

- Roads, paths and squares
- Drains and pipes
- Terrain analysis and design (e.g. building area development, landscaping, landscape design, drainage, canals, basins, dams, dikes, embankments, river development, port construction, landfill, etc.)
- Land allocation and subdivisions
- Surveying

This important and useful software was taught to us by engineer Hassibullah Alemy, whom I would like to thank. There was enough time given for us to practice what was taught, and for us to learn more and get enough from the training. Each of us developed our own projects individually and practiced what we had been taught.

Also, thanks to our office, who provided this important training. Also, I would like to thank our supervisor [redacted], who suggested the idea of this training and who coordinated the schedule. We became very familiar with this software because we really needed it for the projects and assignments that we were working on in faculty this semester. It has proven to be effective for studies and career.

Some of the important menus and points that we learned in civil 3D included:

- Importing survey point data to civil 3D.
- Creating a surface in civil 3D.
- Defining that surface.
- Creating profiles from surfaces.
- Creating alignments and defining that.
- Creating assemblages.
- Defining materials and properties of road profiles.
- Creating profiles and cross sections of each station.

We briefly learned each step that is necessary to create an alignment and the design process. It was really useful training and we are looking forward to other such trainings such as SAP, STAAD Pro, Water CAD and many other engineering software packages.

To: [redacted]

[redacted]

Date: June 01, 2014

Re: AutoCAD Civil 3D

AutoCAD Civil 3D is a CAD software program created by Autodesk. It is an AutoCAD base used for the planning, design and management of infrastructure, development and civil engineering projects such as:

- Roads, paths and squares
- Drains and pipes
- Terrain analysis and design (e.g. building area development, landscaping, landscape design, drainage, canals, basins, dams, dikes, embankments, river development, port construction, landfill, etc.)
- Land allocation and subdivision
- Surveying

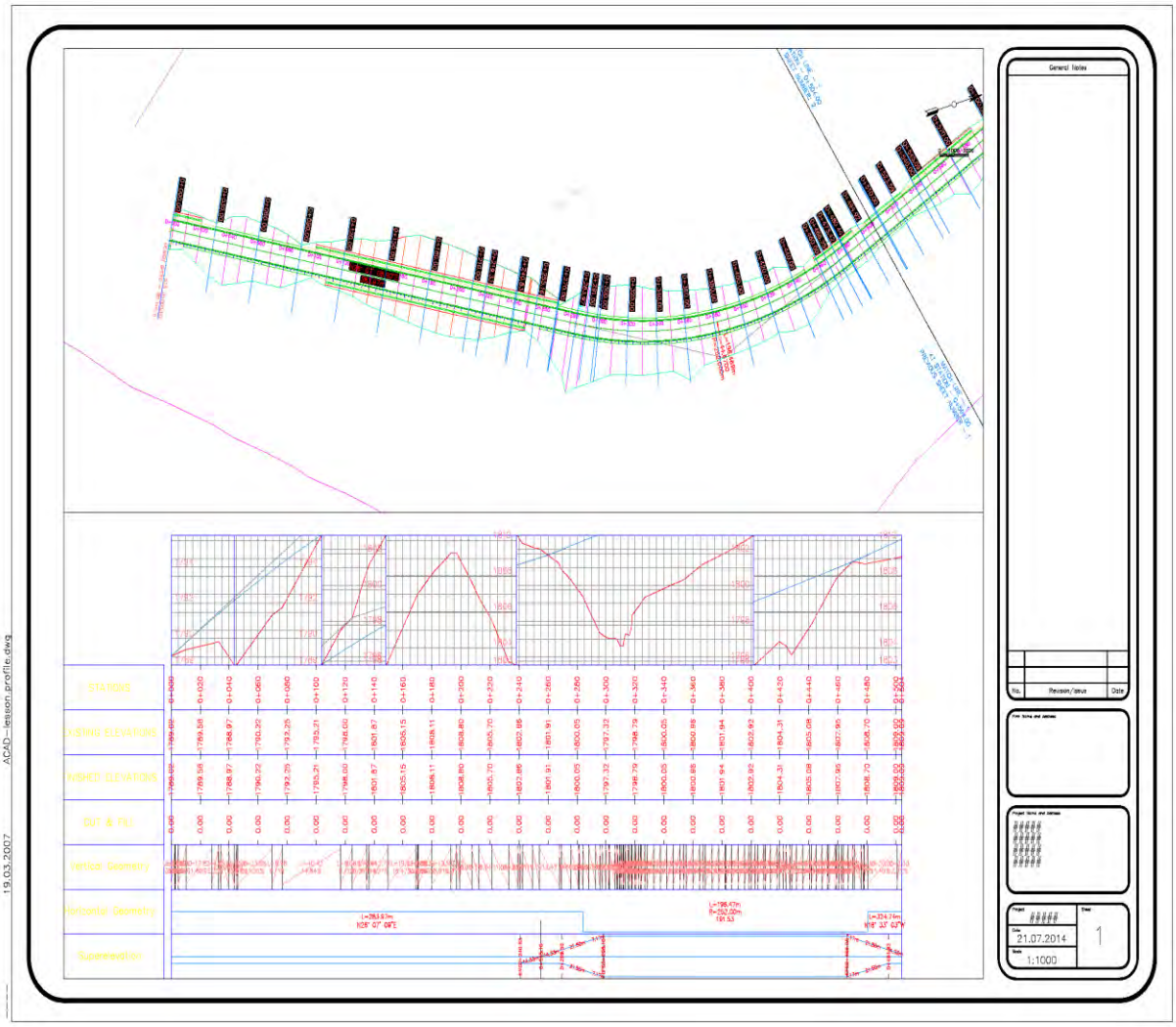
Some of the important menus and points that I learned in civil 3D are listed below:

- How to import surveying points to civil 3D.
- Create surfaces in Civil 3D by going to the "Home" ribbon, clicking Surfaces > Create Surface.
- Then using the Modify Tab > Surface and Add Data > Point Files, we can import points to Civil 3D.
- Creating profiles from surfaces.
- Exploring different ways of representing the surface visually through profiles.
- Creating alignments from profiles that allows to look at profiles (or cross sections) of the surface. This is especially important in design work where you are interested in how the topography varies along some path, which is called an alignment in AutoCAD.

Thanks to our office that provided this training for us, and our supervisors for thinking of the idea and making a schedule that was coordinated with our university classes so that we actually used the software during the semester.

I would also like to thank [redacted] for teaching the software and providing practice sessions for us, and [redacted] who made the schedule work efficiently.

The drawing below is one of my practice drawings on the Mazar road project which I did in civil 3D. I created a surface alignment and provided profiles and corridors for them:



APPENDIX K
ARC GIS TRAINING MEMORANDUM

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: July 21, 2014 and November 12, 2014

Re: GIS Training and Knowledge Transfer

A geographic information system (GIS) is a computer system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.

Our trainer was [redacted] who taught us the following:

- Introduction to GIS
- Usage
- Interfaces
- Creating shape files
- Geo-referencing

GIS was new for me and had not studied it before. It's a very useful program for an engineer. I am thankful that Tetra Tech exposed us to this program. I want to thank [redacted] for teaching us GIS very patiently.

This useful training was one of the most effective training subjects of my life. In addition to the training we received, we created and performed a presentation and knowledge transfer for Kabul University engineering students.

Each of the interns had separate topics to present about the GIS and Google Earth.

First we prepared our presentation in the office and presented it to the Tt management team, after receiving and incorporating their comments, we performed the presentation the next day to the students.

It was an excellent opportunity for all of us to develop our communication skills and self-confidence.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: July 21, 2014 and November 12, 2014

Re: GIS Training and Knowledge Transfer

During this internship program, interns had the opportunity to learn one of the most important software in the engineering field; which is GIS (Geographic Information System). The training was provided by AESP TetraTech office.

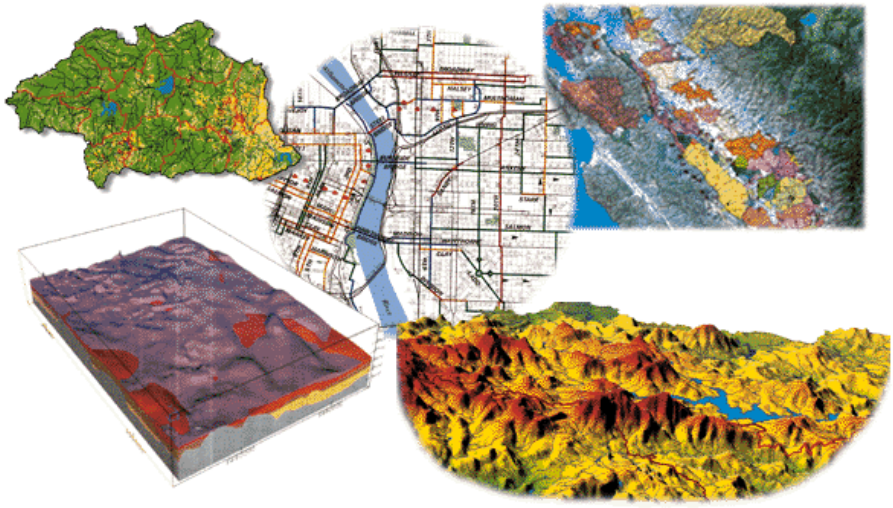
We were trained by Eng. [redacted]i, who has been working as a professional in the GIS field for Tetra Tech. The training was conducted three times a week for three hours (one for lecture and two for practicing).

As we all know, the future world will be a world of technology, so it is important to be exposed to software in all fields to help ease our work. Therefore, GIS is important to know.

Actually GIS is a network, which contains hardware, software, data, procedures and many people. I received a huge amount of information about GIS from this training. I was lucky to receive it, since I had not been exposed to this topic before my internship program.

From this training, I learned:

- How to determine Position of country boundaries.
- How to determine Allocation of funds for sea defenses.
- How to determine Location of hospitals.
- How to determine Routing delivery vehicles.
- How to determine Management of forest stands.



Beside these things I also learned the GIS applications specifically for the engineering fields of:

- Hydrology : Hydrology and Geographic Information System.
- Transportation Engineering : Road networking with GIS.
- Remote Sensing: Remote Sensing Applications.

Other fields in which GIS are used include:

- Crime: Criminal Mapping.
- History: Historical Geographic Information System.

Fortunately, after this useful training, we shared our knowledge about GIS with Kabul university engineering students. The presentation was prepared for the students and lasted for three days (9 – 11 Novomber). The topics which were covered during the three days were:

- GIS Introduction
- Geo referencing
- Databases
- Google Earth
- Map

During these three days, the interns along with the trainer described the above topics in very useful and practical terms, and showed how to convert a hard map to a digitized map and other applications of GIS.

This training discussed many important issues, besides increasing our understanding of GIS, it enabled us to be more comfortable providing presentations and to become more self-confident.

I want to thank [redacted], our sympathetic supervisor [redacted], and all who provided us the opportunity for this training to improve our technical skills in our career.

APPENDIX L
KAJAKI UNIT #2 COORDINATION MEETING MEMORANDUM

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: February 9, 2014

Re: Kajaki Unit # 2 Installation Coordination Meeting

We attended three meetings regarding the Kajaki Unit #2 installation project coordination at the IRD-Equals facility.

The meeting members and participants were GFA, DABS, and USAID.

This meeting is held at IRD every week, where they discuss about update issues, and develop activities for the Kajaki project.

The latest meeting agenda focused on the installation of a turbine generator at the Kajaki Dam Hydro Power Plant (Phase one of two) project.

Phase two of the project will start on June, 2014.

The engineers discussed the topics of planning and scheduling (start date, finish date, project duration, activities percentage, milestones, etc.) of the project.

All meetings discussed the following issues:

- Mobilization
- Security
- Life support services
- Design finalization
- Phase one project schedule
- Development of phase two schedule
- Solicitation process of unit two installation
- Site activities
- Safety
- USACE site contractors, any other business, consultant services, cost and expenses as budget weekly look ahead and client (actions/decisions/directions)

It was a very useful and helpful meeting for all of us.

In this meeting we saw how a meeting is organized for starting a project and which issues should have priority to discuss at the beginning.

I suggested attending additional meetings to improve my experience, build my capacity, to learn more and enhance my management skills.

Overall, my participation in such technical meeting build an understanding of involvements of different stakeholder relationships.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: February 9. 2014

Re: Kajaki Unit # 2 Installation Coordination Meeting

The Kajaki Unit # 2 Installation Coordination Meeting at IRD was our first meeting and the first session that we attended. We went there to get information and learn about how to organize and coordinate an official meeting.

The meeting was held on Feb 09, 2014 at IRD. The attendees included GFA, DABS and USAID. The meeting was called to discuss the installation of Turbine Generator Unit# 2 at Kajaki Dam Hydropower Plant.

The agenda topics for the meeting included mobilization, security, life support services (LLS), design finalization, phase project scheduling, site activity GEF, safety and USACE site contractors.

As I read the weekly report which was given to us by the head of meeting, I got two major points which were really beneficial in my point of view:

1- The importance of this meeting and its agenda which was discussed there.

2- The manner of how to handle and organize a meeting.

This was my first meeting so it made a strong impression on me. The Kajaki dam project is one of the biggest projects in Afghanistan both in terms of manpower and finances. So it really needs to be inspected very carefully and professionally. That's why an official weekly meeting is held by the heads of the project. The agenda structure was what I liked the most. I learned so many things, such as being able to deal with a formal business meeting and its agenda, and the etiquette associated with a business meeting. I am eager to attend the next meeting to become more familiar with the rules and information.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: February 9, 2014

Re: Kajaki Unit # 2 Installation Coordination Meeting

We attended a meeting at IRD, which gave us a good opportunity to improve our management skills.

The meeting agenda was about the installation of a turbine generator at the Kajaki Dam hydro power plant.

The responsible engineers at IRD discussed and prepared information about scheduling of this project and the Kajaki second phase, which had not been started yet. They indicated the dam construction will start in June.

The Design topics of the meeting included:

- Mobilization
- Security
- Life Support Services
- Design Finalization
- Phase 1 Project Scheduling
- Phase 2 Schedule
- Tender Package
- Site Activity GEE
- Safety
- USACE Site Contractor
- Any Other businesses
- Transition activity
- Establish Medical Facilities in Kajaki
- Identify The Location For current storage

- Existing of Material Testing Lab
- Cement Storage
- Safe Room Assessment
- Development of Overall Project

This meeting was a very good opportunity to show how effective and useful information can be transferred during a meeting. This was important for other interns and myself and we hope to attend other meetings to improve our technical skills in our professional careers.

I want to thank the USAID and Tetra Tech organizations, especially the people who assisted in creating our program and provided us the opportunities to attend the meetings.

In summary, attending the technical meeting provides a clear and sound dialog between related parties.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: February 9, 2014

Re: Kajaki Unit #2 Coordination Meeting

We visited the IRD office on February 9 to attend our first construction management meeting. It was a new experience for me and I noticed some important points and how projects actually proceed.

The meeting was mainly focused on scheduling and planning for Phase 2. The meeting was a weekly meeting and all of the concerned parties attended. We were given the weekly report and it was great to check out how a weekly report is actually maintained and written and which points should be included, and how every necessary point was mentioned.

The report, both soft and hard, was professionally prepared. There were discussions on the activities for the week, which included security and design finalization. Phase 1 had already been completed, so all of the discussions were related to Phase two. There was some problems in the RFP solicitation process of unit #2 installation. The parties had to overcome some flaws and obstacles that were found in the RFP of phase 2.

Since it was a significant concern, they organized another meeting to include all of the parties to discuss the verification of phase 2 RFP. There were discussions on all necessary points of work before a project would start and they made sure that there would not be any kind of problem when the project would start whether it would be about the security or life support and safety.

There was talk about facilities expenses and budget and all of the mentioned points were included in the report. It showed that a report has to mention all of the relevant points and it was interesting to see that in the report there were concerns and points mentioned how to reduce the hazards to the environment and health and safety of living organisms.

It is an important point for construction projects to consider all the options when it comes to health and the environment.

We saw how the discussions and how the process of scheduling actually proceeded and how to manage the activities in the document related to the project. It was also interesting to see how the necessary points must be mentioned and arranged, and that the design process never ends till the date finish of the project and all of the work must be according to the design and drawings even though there can be certain changes in every step of the procedure for the betterment of the project.

We want to thank all of the parties included in the meeting, especially the IRD staff members for their cooperative nature and our supervisor for arranging a meeting like this which let us discover new things and learn from them.

We are eager to participate in more meetings like this, since we get to meet professional individuals and it would be beneficial and helpful for us to improve professionally, especially in the etiquette of business meetings.

APPENDIX M
PRESENTATIONS MEMORANDUM

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: April 17, 2014

Re: Sardar Kabuli Girls' High School Presentation

Sardar Kabuli girls' high school was founded by USAID. The Sardar Kabuli Girls High School currently serves over 5,000 female students in a rudimentary two-story building.

We had a presentation in this school on April 17, 2014. The presentation had covered information about (engineering field, how to use internet to get data and find scholarships and role of English language on their future career) subjects.

The presentation goal was to inspire the Sardar Kabuli High School girls to pursue engineering and to learn English and to use internet for the future.

We introduced engineering to them: which fields engineering has, engineering work environment, the good things about engineering, the good income, and Tetra Tech's facilities for female engineers, and for interns.

In this case we ([redacted]) presented and introduction to Engineering with the assistance of the school's administration. We gave them guidance how to be successful in engineering. Our presentation also showed how to use the internet to receive the latest news and information about their lessons and other extra information which was helpful for them. We told them about benefits of learning English and how they can receive the latest version of their lectures in English.

Our team members were: [redacted]

Figure 1: [redacted] presenting to the students of SKGH.

Figure 2: [redacted] during presenting to the students of SKGH.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: April 17, 2014

Re: Interns Presentation to Sardar Kabuli Girls' High School

The presentation that was presented by Tetra Tech interns was quite interesting and made us learn a lot. It was a great experience for us to be encouraged and learn about how research specific topics and give information to people. The topics we discussed included:

- The field of engineering
- The path to becoming an engineer
- The role of the English Language
- The importance of new Internet technology.

The topics presented by Tt's interns were chosen beforehand to be and preplanned to be useful for students. We gave our presentations to 11th and 12th class students. The presentation lasted about two hours. Our preparation included enough practice to be fully prepared. We had been trained on how to get students involved with our presentations and ask us their questions. The time that we were supposed to go to each class and talk to students was limited to 15 minutes. Then we had to let the students ask us questions regarding our topics.

Our supervisor, engineer [redacted] had divided us into two groups, and each group was to present two topics. It is important to mention that two of the Tt engineers were with us to support us during our presentations: Engineer Zurwa and engineer Mariam Safi (last year's intern, and one of Tetra tech AESP's civil engineers).

Fortunately the presentations seemed to be received very well. It was really appreciated by all of us, because it was our first time to present such a presentation. One of the most interesting parts of our presentation was the excitement shown by students, especially for the field of engineering. They were particularly interested in the opportunities for female engineers.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: April 17, 2014

Re: Interns Presentation to Sardar Kabuli Girls' High School

USAID provided us this chance to give a very useful and informative presentation about the importance of engineering, and learning the English language to Sardar Kabuli high school students.

Even though it was my first time ever preparing and giving such a presentation, it was great experience for me. Once again I saw students and it reminded me of my school term.

The main purpose of this presentation was to encourage students to be diligent in their lessons. We also stressed the importance of engineering in Afghanistan, and the importance of learning the English language. And finally, we discussed advances in the technological world and legal usage of internet in their lessons.

We emphasized the concept that it was important for students to study their lessons well, so that they would develop into a professional person in the future, and to give them career options when they take the Kankor exam.

The topics we discussed included:

1. Introduction of presenters
2. Introduction to engineering and engineering fields
3. The life story of interns
4. How interns practice engineering professionalism
5. The procedures to prepare and take the Kankor exam
6. Brief information about English language and use of the Internet
7. Introduction of some important internet sites
8. Options available to study in other foreign countries
9. Various scholarships available from professional and international schools

TETRA TECH

MEMORANDUM

Our group consisted of four persons: [redacted]

I would like to thank the USAID for preparing this program. It was good experience to build up my self-confidence, and in the future I am sure that I will be more self-confident in performing presentations as an engineer. I am thankful to our supervisor [redacted] for her leadership and playing a major role in preparing this presentation and encouraging us during our practice. I am also thankful to the Tt expats and management team who gave us their suggestions and opinions about the presentation. They encouraged us a lot and shared their positive and negative comments, and their ideas about our presenting style and choice of topics.

It was one of the best training experiences of my life to present and describe my feelings about engineering to the students.

Thanks to Tetra Tech and I hope that other schools allow similar presentations to other school students too.

Figure 1: Interns presetting to the students at SKGH.

Figure 2: Group photo of the interns at SKGH.

TETRA TECH

MEMORANDUM

To: [redacted]

[redacted]

Date: April 17, 2014

Re: Interns Presentation to Sardrar Kabul Girls' High School

On April 17, we got the opportunity to go to the Sardar Kabuli girls' high school and be an inspiration for them as female engineers and educated people.

We explained to them how they can continue their education and pursue their dream job. They can improve and achieve anything they want and that they are not ordinary people; they are the hope of Afghanistan. We also explained that everyone's eyes are on them and they have to be responsible and fulfill the expectations of our war torn people and bring hope in our lives and future generations. As females, they have to continue their education stand on their own feet. All they have to do is to make use of the opportunities that come to them, since all of the nations around the world now want to help us. One of the most important donor focuses is on them as they are women. There are a lot of chances in different fields for women. We woman are the people who make the foundation of society. Prior to that we have to try hard and put effort into it and build our country side by side with man power.

It was actually a chance for us to go and meet our young female citizens and give them information about the engineering field. We explained about the opportunities that exist for woman in Afghanistan. Also, how education is an important and necessary factor for success since everyone, whether man or woman, wants to achieve a lot and be a winner. We used the time that we were given and explained to them about how gaining knowledge can positively affect their lives and how actually it affected us. We talked about the experiences that we had during high school and what kind of hardships the students can expect on their journey, and how they can get ready for it, such as preparing for the Kankor examination. We had the chance to make them aware of how the Internet and the English language can help them in their lives and help them in gaining knowledge and pursuing their dreams and how actually it brought value into our lives.

The new Afghan president has now decreed that the medical and engineering universities change the language of learning from Dari to English.

This was because during a trip to Iran, an Iranian female doctor inspired him. She explained the important factors that made her achieve a lot in life and that the main factor was actually learning the English language. This had a strong impact on the President and he decided to make a change to his nation's educational system.

If this was a wakeup call for our president, we too should have the realization that engineering subjects and books should all be in English. When most of the students come to an engineering university, they face problems, especially those that come from rural areas.

Some even have to take one year off for language preparation. All of the standard education systems are in English. Even our neighboring countries use some technical English expressions and idioms in their universities, as they have to reach the level of the surrounding countries. This has had a positive impact on their education systems.

If we want to be competitive in the technology and science race we have to first reach the same level that other nations have reached. We have to first of all, have to find the enthusiasm in ourselves to gain and hope for a bright future for our country.

For reaching that level we have to use and be aware of the facilities and technologies that other nations around the globe use and how those technologies have affected them. In this 21st century everyone should be using the latest technology if they want to improve themselves and have an easy life.

They should broaden their view and look out of the box. They can do all this by using the internet. They can get the news and information on almost everything and they can do research on the topics they study or that they are interested in. Their view will get broader and their destination and the size of their dreams will get bigger. Their life point of view will be clearer and they can find the things that would inspire them. Their choices about occupations would be better so they could continue their career in it and have a safe and magical life journey.

They would serve their people better. Since everything has a negative and positive side to it, if they choose to think positively, they will gain positively. It is up to them as to what they want to do. They have to be cautious regarding all matters that they face in their life and if we would use the internet as a tool to gain knowledge there will be a positive feedback. We gave examples of successful female engineers and people who reached their goals by using the advice above. We would like to thank USAID our supervisors and all the staff involved in this task. They helped us to improve personally and professionally. It boosted our self-confidence and was also a realization of dreams and goals for us too.

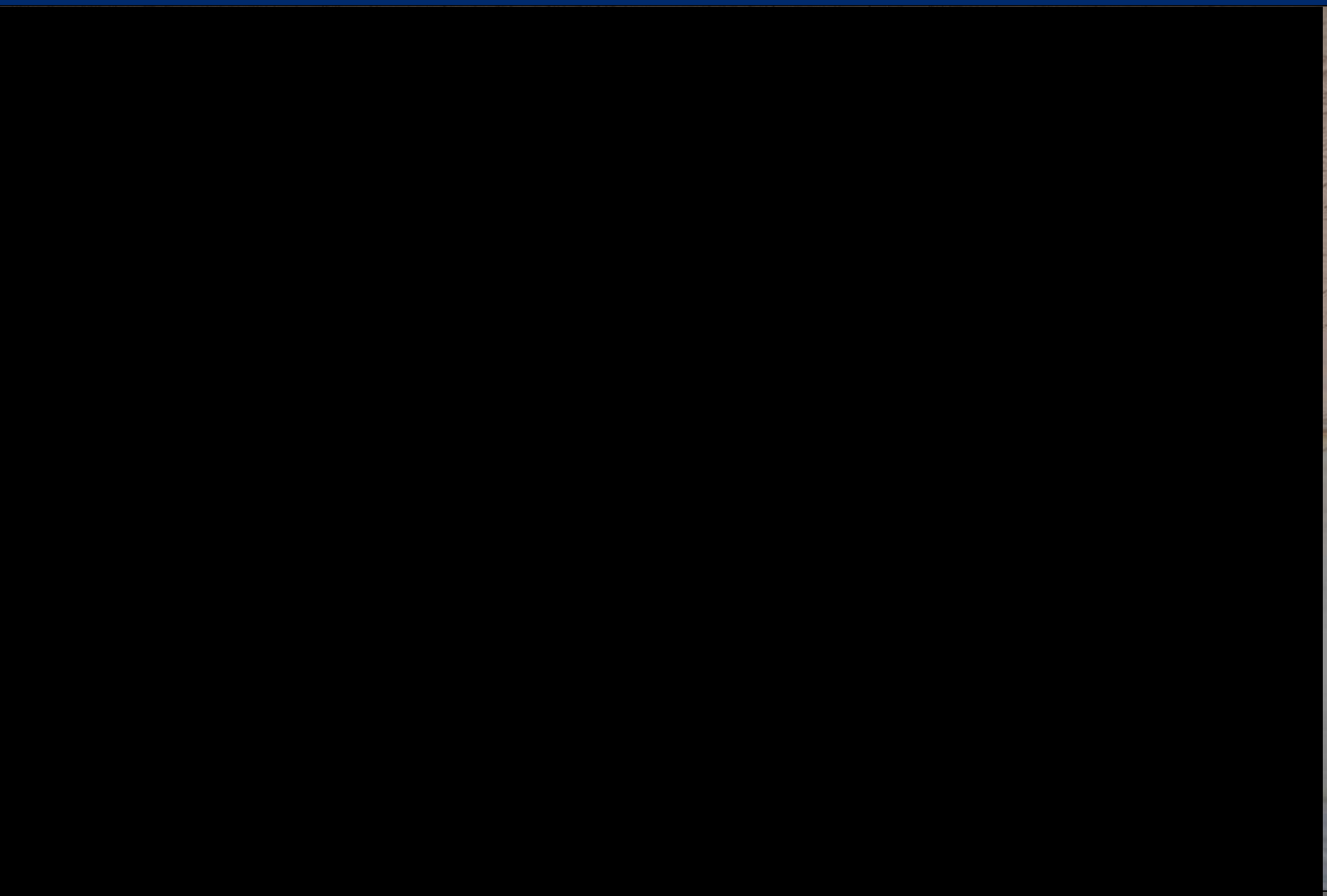
APPENDIX N
INTERNSHIP PROGRAM CURRICULUM

USAID | AFGHANISTAN
FROM THE AMERICAN PEOPLE

ENGINEERING SUPPORT PROGRAM

WO-LT-0042
AFGHAN WOMAN INTERSHIP PROGRAM

2014 CURRICULUM



July 22, 2014

This publication was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech, Inc.

This report was prepared for the United States Agency for International Development, Contract No. EDH-I-00-08-00027-00, Task Order 01, Afghanistan Engineering Support Program.

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TETRA TECH

July 22, 2014

[redacted]
USAID – Office of Economic Growth and Infrastructure (OEGI)
USAID/Afghanistan
Great Massoud Road
Kabul, Afghanistan

Re: Afghanistan Engineering Support Program (AESP)
Work Order LT-0042 Afghan Woman Internship Program

2014 Internship Program Curriculum

Dear [redacted],

Enclosed is the 2014 Afghan Women Internship program curriculum. The curriculum combines resources and various opportunities available at USAID and AESP to provide a rounded engineering internship program.

In close cooperation with expatriate engineers and local national professionals the internship provides the interns opportunities to apply skills and concepts learned through university coursework in a professional engineering environment

Please contact us should you have any questions or comments regarding the curriculum.

Respectfully,
Tetra Tech, Inc.

[redacted]
[redacted], PE, BCEE
Chief of Party (AESP)

cc: [redacted] (USAID-OEGI)

AFGHANISTAN ENGINEERING SUPPORT PROGRAM

WO-LT-0042
AFGHAN WOMAN INTERSHIP PROGRAM

CURRICULUM

July 22, 2014

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1.0 PROGRAM OVERVIEW

1.1 INTRODUCTION

This training curriculum supports the goals outlined in the Scope of Work (SOW) - WOLT0042 Afghan Women Internship program. Tetra Tech (Tt) strives to provide an effective internship opportunity for local national female engineering and architectural students under the Tetra Tech Afghanistan Engineering Support Program(AESP). In close cooperation with expatriate engineers and local national professionals this curriculum provides the interns opportunities to apply skills and concepts learned through university coursework in a professional engineering environment.

1.2 OBJECTIVE

The objective of the curriculum is to provide the interns participating in the Afghan Women Internship program a desirable learning experience for professional development. The curriculum exposes students to aspects of project estimation, construction materials, quality control and quality assurance, construction health & safety, project design, energy training, project management, technical writing, effective presentation and engineering software. The programs are considered both in theory and practice through project assignments, shadowing, site visits and involvement with ongoing engineering work. The provided curriculum includes the overall training framework and schedule (Appendix A), Pre-Event Assessment questionnaire (Appendix B) and Post Event Evaluation questionnaire (Appendix C).

1.3 OUTCOME

The training curriculum supports the learning objectives of the Afghan Woman Internship program through engineering practice, workshops and hands on training of various engineering techniques and applicable engineering software. The curriculum details benchmarks and outcomes desired for future application in the interns professional careers.

The assessments, evaluations and deliverables will be included in the final internship program report, submitted at the completion of internship period.

2.0 ENGINEERING PRACTICAL

The interns will work directly with lead expat engineers and local national professional engineers in a team environment to support work order efforts. The interns will perform a variety of routine engineering assignments in a training status under close supervision. The interns will perform basic engineering tasks such as the review of less complex plans, performance of basic engineering calculations, and the inspection of parts of an engineering project.

3.0 SPECIALIZED TRAINING AND WORKSHOPS

Specialized training and workshops are supplemental to the engineering practicum.

3.1 SPECIALIZED TRAINING:

3.1.1 Project Estimation

The content of the training will cover Project Cost Management, Construction Material Estimates (Quantity Take-Off), Construction Cost Estimates, Operation and Maintenance Cost Estimates (Short and Long Term O&M Budget Estimates) and Coaching.

Deliverable: A report/memo detailing the training themes summarizing what was learned, and the impact on their professional career.

3.1.2 Construction Material Training

3.1.2.1 Concrete

The content of the training will cover lecture on mix design, concrete mixing activity which includes calculation of cement, aggregate, sand and water amounts for different types of concrete. Hands-on concrete testing in the lab (i.e. concrete strength, slump test, etc.).

Deliverable: A technical memo detailing the concrete lecture, mix design activity, and concrete testing experience.

3.1.2.2 Soil

The content of the training includes lectures on Soil Mechanic in theory, hands on Soil testing in the lab which will include; California Bearing Ratio (CBR) test, moisture content, Atterberg limits, Proctor test, soil classification, and coaching sessions.

Deliverable: A technical memo of the training, lecture, soil testing in the lab and a summary of results and impact of this training in their professional career.

3.1.2.3 Asphalt

The interns will receive lectures on asphalt in theory, hands on asphalt testing in the lab, coaching sessions and site visits to an ongoing road projects (if available).

Deliverable: A technical memo of the training, lecture and asphalt testing in the lab. The technical memo will include the asphalt result and impact of this training on the interns' future professional career.

3.1.3 Quality Control and Quality Assurance

The content of the training is an introduction to construction quality management benefits, contractors, responsibilities of quality control(QC) organization, responsibilities of QC Manager, qualifications and evaluations, daily QC Reports, request for information (RFIs), daily & weekly Quality Assurance (QA) report, QA and QC sequential checklists, Three phases of inspection, and QC/QA coordination meeting, quality control testing, quality control plan, and discussions.

Deliverable: A technical memo on quality control and quality assurance aspects, its impact on interns' skill enhancement and its use in their future professional career.

3.1.4 Construction Health and Safety

The content of the training will cover introduction to OSHA, Management of Health & Safety, site safety and Health Officer, top causes of site accidents and scaffolding.

Deliverable: A technical memo on the Health & Safety aspects of the construction projects.

3.1.5 Project Design

Interns will be tasks to design a hypothetical two (2) stories building. The interns will provide an architecture plan, elevations and sections, structure analysis, loading calculation and electrical design and project report.

Deliverable: A technical memo detailing the design exercise, what they discovered and learned, a summary of results and impact of the design exercise in their professional career. A professional engineer will provide a critic of the one story building and CAD drawings and provide a summary of the completed project.

3.1.6 Electrical Training

This training will cover industrial heat tracing, lighting, photovoltaic system sizing, renewable energy and the environment, specification and drawings for medium voltage line construction, ground rods, electrical load estimation, lightning effect, SC lecture & exam questions, transmission line, transformer, medium voltage line, medium voltage material, substation, basic design, wiring, general about city power and electrical load estimate.

Deliverable: A technical memo summarizing the results and impact of this training in their professional career with an example of a small project lighting design.

3.1.7 Technical and Effective Writing Workshop

This workshop will cover technical writing in general, writing rules, writing memos, quarterly report and final reports.

Deliverable: The skills learned will be applied to all deliverables outlined in this curriculum.

3.1.8 Project Management Workshop

This workshop will cover a basic overview of project management, scheduling and work load balancing.

Deliverable: A technical memo detailing the skills from acquired training

3.1.9 Effective Presentation Workshop

This training will cover presentation techniques and tools.

Deliverable: Interns to create a presentation on an engineering topic of interest or relevant training.

3.1.10 Shadowing

Interns will have discussions with Professional Engineers at USAID about real engineering world, current engineering projects and challenges.

Deliverable: A technical memo detailing the shadowing experience including suggestions and recommendations for future shadowing opportunities.

3.1.11 Site Visits

The interns will see Tarakhil Power plant, and observe the application of engineering drawings in real world situation. An ongoing construction project at U.S. Embassy will be observed and toured.

Deliverable: A technical memo detailing their experience, what was observed and overall project.

3.2 ENGINEERING SOFTWARE TRAINING:

3.2.1 Auto CAD

The content of the training is an introduction to Auto CAD, setting up a template, exposures to the AutoCAD workspace and layout, menus and short cuts, the use of basic drawing, editing, and viewing tools, organizing drawing objects on layers. Insert reusable symbols (blocks), add text, hatching, and dimensions, the use of scales, the preparing a layout to be plotted, and plotting a drawing and an Auto CAD project.

Deliverable: A technical memo on what was learned and its impact on their future career goals and an example of their CAD practice in Tt CAD Standards.

3.2.2 Auto CAD Civil 3D

This training will cover an introduction to Auto CAD Civil 3D, preparing a topographical plan, creating points, creating surface, creating alignment, creating profiles, creating corridors, creating sections, geometric design of road, project and assignment.

Deliverable: A technical memo summarizing results and impact of this training in their professional career with an example of the drawings including plans, sections, profile and details in Tt standards.

3.2.3 GIS (Geographical Information System)

The content of the training is introduction to GIS, Arc Map interface and tools, data view and layout view, layers, data frames, and map elements, layer properties for symbols and labels, tools for examining your data, working with the selection tools, metadata, geographic data review, linking features and attributes, data formats, working with Arc catalog, editing spatial data, editing attribute data, Geo referencing, coordinate systems, datum, projections and distortion, projecting data, table structure, data types, table manipulation, connecting tables, working with graphs and reports, basic cartographic concepts, creating maps in Arc Map, printing and plotting maps.

Deliverable: A technical memo summarizing what was learned and the impact of this training in their professional career. Creation of an area map.

3.2.4 STAAD Pro

This training will cover introduction to STAAD-Pro V8 in and its space, menus (File, Edit, View, Tools, Geometry, Select, Commands, Analyze, Mode, Window), A multi-story concrete moment resisting frame Example using STAAD-Pro V8i, project introduction, modeling, loading, analyze, design and project report**.**

Deliverable: A technical memo on what was learned, a summary of results and impact of this training in their professional career including the design and analysis of one story residential building.

3.2.5 MS Project

This training will cover introduction and overview, activity breakdown, sequence activities, assign resources, assign durations, develop and control schedule and level resources automatically and view leveling results.

Deliverable: A technical memo covering what was learned, a summary of results and the impact of this training in their professional career. Creation of a schedule for a project workorder.

APPENDIX 1

TRAINING FRAMEWORK AND SCHEDULE

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
5.1.1 Project Estimation	The Project Estimation training lectures includes of following: • Lectures on theories of project estimation • Project Cost Management • Construction Material Estimates • Construction Cost Estimates (Quantity Take-Off) • Operation and Maintenance Cost Estimates (Short and Long Term O&M Budget Estimates)	All intern student trained by end of program	Tt, Training Pack ,Tt local and international specialist	Tt AESP Civil Department	June 19 , 2014 to June 26, 2014	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Project Estimation	Intern student apply the training they have received

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
5.1.2 Auto CAD	The Auto CAD training includes following topics: • Introduction to Auto CAD • Contents Set up a template • Understand the AutoCAD workspace and layout • Understand Auto CAD Menus and Short cuts • Use basic drawing, editing, and viewing tools • Organize drawing objects on layers • Insert reusable symbols (blocks) • Add text, hatching, and dimensions • Use scales • Prepare a layout to be plotted • Plot drawings • Auto CAD Projects	All intern students trained by end of program	Tt, Training Pack ,Tt local and international specialist	Tt AESP Civil Department	• Learning January 25, 2014 to March 25, 2014, 2 hours per day • Practicing March 26, 2014 to May 08, 2014, 2 hours per day	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Auto CAD	Intern student apply the training they have received
5.1.3 Civil 3D	The civil 3D software training includes following topics : • Introduction to Civil 3D • Preparing Topographical plan • Creating Points • Creating Surface • Creating Alignment • Creating Profile • Creating Corridors • Creating Sections	All intern students trained by end of program	Tat, Training Pack ,Tt local and international specialist	Tt AESP Civil Department	Learning April 25, 2014 to June 05, 2014, 2 hours per day Practicing June 06, 2014 to	2 Civil Students	Improve technical capacity of intern students on Civil 3D	Intern student apply the training they have received

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
	• Geometric design of road • Project • Assignment				June 15, 2014, 2 hours per day			
5.1.4 GIS	The GIS training includes following topics: • Introduction to GIS • The Arc Map interface and tools • Data View and Layout View • Layers, data frames, and map elements • Layer properties for symbols and labels • Tools for examining your data • Geographic data review • Linking features and attributes • Data formats • Working with Arc Catalog • Editing spatial data • Editing attribute data • Coordinate systems • Datum • Projections and distortion • Projecting data • Table structure • Data types • Table manipulation • Connecting tables • Working with graphs and reports • Basic cartographic	All intern students trained by end of program	Tt, Training Pack ,Tt local and international specialist	Tt AESP Civil Department	June 16, 2014 to July 16, 2014, 2 hours per day	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on GIS	Intern student apply the training they have received

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
	concepts • Creating maps in Arc Map • Printing and plotting maps							
5.1.5 STAAD-Pro	The STAAD-Pro software training includes following topics: • Introduction to STAAD-Pro V8in and its space • Menus (File, Edit, View, Tools, Geometry, Select, Commands, Analyze, Mode, Window) • A multi-story concrete moment resisting frame Example using STAAD-Pro V8i • Project introduction • Modeling • Weight of the structure • Loading • Analyze • Design • Project report	All intern students trained by end of program	Tt, Training Pack ,Tt local and international specialist	Tt AESP Civil Department	July 20, 2014 to Aug 30, 2014, 2 hours per day	2 Civil Students	Improve technical capacity of intern students on STAAD-Pro	Intern student apply the training they have received

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
5.1.6 MS Project	The MS Project software training includes following topics: • Introduction and Overview • Starting Project • New Features & Save project • Import Outlook Tasks • Create a New Project • Entering Tasks • Insert Tasks • Elapsed Duration • Set a Milestone • Setting up People • Adjusting Availability • Setting up Equipment • Setting up Material • Setting up Costs • Assign a Calendar to a Task • Lag and Lead Time • Using Constraints • The Critical Path • Create a Task Calendar • Delete a Calendar • Change the Timeline • Project Duration • Create a Resource Pool • Change Resource Information • Over allocation Report • Level Resources Automatically • View Leveling Results	All intern students trained by end of program	Tt, Training Pack ,Tt local and international specialist	Tt AESP Civil Department	September 1, 2014 to September 30, 2014, 2 hours per day	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on MS Project	Intern student apply the training they have received

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
5.1.7 Electrical Training	The Electrical training includes following topics: • Industrial Heat Tracing • Lighting • Photo Voltaic System sizing • Renewable energy and the environment • Specification and Drawings for 24.9/14.4 kV line construction • Ampere Ground Rods • Electrical Load Estimation • lightning effect • SC Lecture & Exam Questions • Transmission line • Transformer • Medium voltage line • Medium voltage martial • Substation • Basic design • Wiring • General about city power • Electrical loud estimation	All intern students trained by end of program	Tt, Training Pack ,Tt local and international specialist	Electrical Department – Tt AESP	Learning & Practicing Feb 05, 2014 ongoing	2 Electrical Students	Improve technical capacity of intern students on Electrical Training	Intern student apply the training they have received
5.1.8 Concrete Training	The concrete training includes of following: Lecture on mix design • Concrete mixing activity, Each of the interns asked to do calculation for specific concrete mix • Concrete testing in the	All intern students trained by end of program	Tt, Training Pack ,Tt local and international specialist	Transportation Department – Tt AESP	April 24, 2014 to May 08, 2014.	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Concrete Training	Intern student may not apply the training they have received in site

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
	lab • Asking questions and writing memos							
5.1.9 Soil Training	the Soil training includes of following: • Lecture on Soil • Soil testing in the lab (CBR, Moisture Content, Atterberg Limit, Proctor test, Soil Classification, Subgrade Soil) • Asking questions and writing memos	All intern students trained by end of program	Tt, Training Pack ,Tt local and international specialist	Transportation Department – Tt AESP	May 15, 2014- May 22, 2014,	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Soil Training	Intern student may apply the training they have received in site
5.1.10 Asphalt Training	The Asphalt training includes of following: • Lecture on Asphalt • Asphalt testing in the lab • Asking questions and writing memos	All intern students trained by end of program	Tt, Training Pack ,Tt local and international specialist	Transportation Department – Tt AESP	Learning June 05, 2014 Practicing June 12, 2014,	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Asphalt Training	Intern student may apply the training they have received in site
5.1.11 Quality Control & Assurance Training	The QA/QC training includes of following: • Introduction to Construction Quality Management, Definition, History, • Why is CQM necessary? Benefits of CQM, Contractor Responsibilities • Contractor Evaluations • Bill of Quantities • Daily & Weekly QA Report	All intern students trained by end of program	QCM package	Conference Room – Tt AESP	Learning Sep 03, 2014 to Sep17, 2014, 2 hours per day	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Quality Control & Assurance Training	Intern student may apply the training they have received in site

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
	• QA and QC Sequential Checklist • Three Phases of Control • Daily QC Reports • Requests for Information • (RFIs)_Tracking • QC/QA Coordination Meeting • Quality Control Testing • Quality Control Plan • Discussion							
5.1.12 Health & Safety Training	The Health & Safety training includes of following: • Introduction to OSHA • Management of Health & Safety • Safety Management • Site Safety and Health Officer • Top Killers • Scaffolding	All intern students trained by end of program	OSHA Manual	Conference Room – Tt AESP	Learning Aug 24, 2014 to Aug 31, 2014	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Safety Training	Intern student may apply the training they have received in site
5.1.14 Shadowing Training	The Shadowing training includes of following: • Arranging with USAID • Selecting the Topics • Discussion with Professional Engineers at USAID and asking questions • Writing memos about the shadowing	All intern students trained by end of program	USAID	USAID	February 02, 2014 ongoing	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Shadowing Training	Intern student apply the training they have received

Training	Summary	Indicator	Evidence	Location	Duration	Participants	Results	Assumption
5.1.15 Technical Writing & Effective Writing Skills Training	Technical and Effective Writing training includes of following: • Technical Writing Training, Correct Writing roles, How to present? • Writing Memos, Quarter Final Reports for the performed activities • Review of the mentioned reports by Technical Lead or Expats • Finalized the reviewed reports	All intern students trained by end of program	Hand out	Conference Room – Tt AESP	Learning March 1, 2014 to March 08, 2014 Writing after each activity - ongoing	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Technical Writing & Effective Writing Skills Training	Intern student apply the training they have received
5.1.16 Site Visit	The Site Visit includes of following: • Tarakhil Power plant, Brief description about the Project, Going to the site, Introduction to the site, Asking questions, writing memos • U. S. Embassy, Brief description about the Project going to the site, Introduction to the site, • Asking questions, Writing memos	All intern students trained by end of program	Tarakhil PP and USAID	US Embassy	frequentl y	2 Civil & 2 Electrical Students	Improve technical capacity of intern students on Project site visit	Intern student may apply the training they have received in site

APPENDIX B

PRE-EVENT QUESTIONNAIRE*

Name/Date of Event

Example

- What is AutoCAD Civil 3D?
  _____
  _____
  _____
  _____

- Have you participated in an AutoCAD Civil 3D workshop before? If so, what did you like?
  _____
  _____
  _____
  _____

- How does civil 3D works?
  _____
  _____
  _____
  _____

- What is different between Civil 3D and AutoCAD?
  _____
  _____
  _____
  _____

- Have you ever used engineering software? If yes please explain which software?
  _____
  _____
  _____
  _____

- What techniques/tools would you like to learn during the Auto Cad Civil 3D Training?
  _____
  _____
  _____
  _____

*This questionnaire will be customized for a particular training or workshop.

APPENDIX C

POST-EVENT EVALUATION

Name/Date of Event

EXAMPLE**

- What topics or aspects of the workshop/training/shadowing/site visit did you find most interesting or useful?

  _____
  _____
  _____
  _____

- Knowledge and information gained from the workshop/training/shadowing/site visit?

  _____
  _____
  _____
  _____

- Explain what your learned from the workshop/training/shadowing/site visit that will be useful/applicable in your career?

  _____
  _____
  _____
  _____

- How do you think the workshop/training/shadowing/site visit could have been made more effective?

  _____
  _____
  _____
  _____

** This evaluation will be customized for a particular training or workshop.

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